

MAY 10 1924

Vol. 21, No. 4

PSYCHOLOGICAL REVIEW PUBLICATIONS

April, 1924

Psychological Bulletin

EDITED BY

SAMUEL W. FERNBERGER, UNIV. OF PENNSYLVANIA

HOWARD C. WARREN, PRINCETON UNIVERSITY (*Review*)

JOHN B. WATSON, NEW YORK (*J. of Exp. Psych.*)

SHEPHERD I. FRANZ, GOVT. HOSP. FOR INSANE (*Monographs*)

MADISON BENTLEY, UNIVERSITY OF ILLINOIS (*Index*)

WITH THE CO-OPERATION OF

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PUBLISHED MONTHLY BY THE

PSYCHOLOGICAL REVIEW COMPANY

27-29 COLUMBIA STREET, ALBANY, N. Y.

AND PRINCETON, N. J.

AGENTS: G. E. STECHERT & CO., LONDON (2 Star Yard, Carey St., W.C.);
PARIS (16, rue de Condé)

Entered as second-class matter at the post-office at Albany, N. Y., September 25, 1922

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SAMUEL W. FERNBERGER, UNIV. OF PENN. (*Bulletin*)

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Review, Bulletin, and Journal: \$14.00 (Foreign, \$14.75).

Review, Bulletin, Journal and Index: \$15.00 (Foreign \$15.75).

Current Numbers: Review or Journal, \$1.00; Bulletin, 60c; Index, \$2.00.

Psychological Monographs: \$6.00 per volume (Foreign \$6.30).

Current Issues: prices vary according to size.

Subscriptions, orders, and business communications may be sent direct to the

PSYCHOLOGICAL REVIEW COMPANY
ALBANY, N. Y., and PRINCETON, N. J.

FOREIGN AGENTS: G. E. STECHERT & CO., London (2 Star Yard, Carey St., W.C.) Paris (16, rue de Condé)

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THE PSYCHOLOGICAL BULLETIN

PROCEEDINGS OF THE THIRD ANNUAL MEETING OF
THE WESTERN PSYCHOLOGICAL ASSOCIATION, LOS
ANGELES, CALIFORNIA, SEPTEMBER 18 AND 19, 1923

W. R. MILES, STANFORD UNIVERSITY, CALIFORNIA, SECRETARY

The third annual meeting of the Association was held in conjunction with the Summer Meeting of the American Association for the Advancement of Science at the University of Southern California, Tuesday and Wednesday, September 18 and 19, 1923. There were four sessions for the reading of papers and for discussion. About fifty-five members and visitors were in attendance. Dr. A. H. Sutherland very efficiently served as chairman in charge of local arrangements. Since both the President, Dr. E. C. Tolman, and Vice-President, Dr. J. E. Coover, were unavoidably absent from this meeting, Dr. Sutherland presided at all the gatherings.

At the first session, the Association was honored by an address of welcome from President R. B. von KleinSmid of the University of Southern California, who spoke on the relation of psychology to crime and pointed out the interesting possibility that psychological methods may soon be used in connection with the police force in Los Angeles.

Dr. E. E. Slossen, Director of Science Service, Washington, D. C., attended two of the psychology programs. To individual members he stressed the difficulty experienced by Science Service of securing material from psychologists as a group of scientific workers. He stated that there is as great if not greater demand for psychological news items as for those from any other field.

Opportunity was given to visit the Psychology Department, at

the Southern Branch of the University of California, Los Angeles, and also to see Whittier State School, at Whittier.

Solar Eclipses and the Theory of Relativity occupied most of the general program for the A. A. A. S. It was certainly an oversight that a symposium had not been arranged for by some of our group on the subject, the "Psychology of Total Eclipses" for much could have been said on the topic. In his address on "The Meaning of History as Illustrated by the Records Secured at Rancho La Brea," Dr. John C. Merriam, President Carnegie Institution of Washington, gave some place to psychological factors in discussing the species of animals so numerously entrapped in the tar lakes at La Brea.

The Association continued its Committee on Publicity and there was considerable discussion of this topic in connection with the paper by Professor F. E. Bolton on "The Fakir in Psychology."

The officers elected for the year 1923-24 were the following:
President, Professor Edmund S. Conklin, University of Oregon.
Vice-President, Dr. Arthur H. Sutherland, Director of Department of Psychological and Educational Research, Los Angeles City Schools.

Secretary-Treasurer, Professor W. R. Miles, Stanford University.

An invitation was received through Frederick E. Bolton for the Association to meet at the University of Washington, Seattle, however, arrangements have been made to hold the next meeting at Stanford University, August 8-9, 1924. Psychologists are cordially invited.

ABSTRACTS OF PAPERS

The Possibility of a Nonphysiological Behaviorism. V. H. ARNOLD, University of California, Berkeley.

Of the many objections urged against behaviorism, the one most frequently encountered is the indictment that psychology behavioristically conceived, is indistinguishable from physiology. This indictment is unjustified for the terms physiology and psychology stand for two distinct types of scientific interrogation. They subsume the same phenomena under disparate categories; the former analyzes the reactions of the organism in terms of its neuromuscular-glandular components, while the latter describes these same activities as functions of the environment. The physiological analysis resolves organic activity into a physico-chemical series. When viewed

physiologically the essential discrepancies between various modes of behavior vanish and those phenomena which seemed essentially distinct become, when subsumed under physiological rubrics, indistinguishable.

Mood in Relation to Performance. ELIZABETH T. SULLIVAN, Department of Psychological and Educational Research, Los Angeles.

The study was undertaken with a desire to find out some of the factors that enter into temperament, moods or dispositions and to get some insight into any relation that may exist between mood and physical and mental performance. The tests employed were pulse rate, systolic blood pressure, diastolic blood pressure, pulse pressure, drawing of a line to equal in length a remembered standard, two point threshold, strength of grip (right and left hand), tapping, color naming, addition, and a free association test.

These tests were given to three different groups of individuals aggregating 18 women and 20 men, ranging in age from twenty to fifty-one with the median at thirty to thirty-two. The tests for each group were given on the same day under uniform conditions for the group, at the same hours (between one o'clock and four o'clock P.M.) by the same person (the writer) and in the same order.

The method of rank difference was used in the statistical treatment of the data, provision having previously been made for obtaining a fair degree of certainty in the objective marking for mood and also for eliminating the effect of practice from the actual scores secured by the tests.

Summary and Conclusion: 1. The conspicuous feature of this investigation is the low coefficients that result from correlating measures of mood with tests of performance.

2. The results differ widely not only with regard to the performance of the separate individuals but with regard to the individual's performance in the several tests.

3. The median coefficients for the three groups, men and women combined, are practically zero for all the fifteen tests.

4. The correspondence is fairly close between the actual distribution of the coefficients and the normal distribution for the sexes considered separately or combined in the ten tests that are more definitely tests of performance.

The median coefficient for both men and women is practically zero and the 25 percentile, the 75 percentile and \bar{Q} are within .31

of zero for the men and women considered separately or combined. Fifty per cent of the coefficients lie between the distance $I.Q$ and $-I.Q$. The per cent of coefficients that lie within the remaining distances of Q is very close to the per cent of measures included within these distances in the normal curve of distribution.

5. No single test shows a sufficiently marked departure from the normal distribution to conclude that mood had influenced results.

6. There is little to indicate individual differences.

7. If a very marked relation existed between the mood and the performance of the individual tested it is likely that it would have appeared to a more noticeable extent than it has in the results of this experiment. This statement of the situation is offered:

Extremes of mood act as distractions, the absence of any demonstrable effect on performance being due to the tendency of the individual to overcome resistance by increasing the output of energy.

Internal Factors Conditioning the Date of Appearance of Congenital Sexual Behavior of the Young Male Albino Rat. CALVIN P. STONE, Stanford University.

The investigation herein reported deals with acceleration and retardation of congenital sexual behavior through the regulation of dietary factors.

Sexual libido awakened in young male rats reared on a superior diet from three to four weeks earlier than it awakens in rats reared upon various diets widely used in laboratories during the past fifteen years. Males attempting copulation at the early ages of 40 to 50 days had few or no spermatazoa in their reproductive tract. At the ages of 45 to 55 days ripe spermatazoa were found in the testes and ductus deferentes in great numbers, yet insemination of females was not possible because of inadequate development of the organs of intromission. Between the ages of 55 and 65 days these organs attained sufficient development to permit insemination.

The overt manifestations of sexual libido were also retarded in males reared upon defective diets. A period of inanition in which the males were held at "maintenance" for 20 days beginning in one group at the age of 20 days and in another at 30 days, and in still another at 45 days, retarded the awakening of copulatory ability by amounts varying from 15 to 30 days. In these three experiments the quality of the diet was satisfactory during the twenty days in-

terval, but the quantity inadequate. In other experiments wherein dietary deficiencies were qualitative rather than quantitative, different amounts of delay were manifested in both the somatic and behavior aspects of sexual development.

A Study of Certain Factors Influencing Static Equilibrium. FRANK-LIN S. FEARING, Stanford University.

The object of this paper was to present the results of (1) a quantitative analysis of the amount of lateral and anterior-posterior sway in a group of normal adults with reference to certain factors—particularly height, weight, and position of feet, and (2) an analysis of the record of amount of sway of a single individual over an extended period of time (approximately 8 months). The Miles Ataxiameter (*Journal of Industrial Hygiene*, II, 1922) was used. This instrument measures in millimeters the length of the path traversed in anterior-posterior and lateral sway. In the first part of the study the subjects (36 women and 80 men) stood erect with the eyes closed; two positions of the feet were assumed, one with the heels touching and an inside angle of 45 degrees, and the other with the heels and toes together. The period of time was two minutes for each position.

The results showed that the 45 degree position was the more stable. There was more sway in the anterior-posterior plane than in the lateral plane for both positions of the feet, but in the 45 degree position the anterior-posterior sway is 70 per cent greater, while in the Romberg position it is 12 per cent greater than lateral sway. The correlation between sway in the two planes was plus .75 for the 45 degree position and plus .93 for the Romberg. The correlation between total sway in the two positions was plus .68. Height correlates with sway (plus .20 in the 45 degree position and plus .15 in the Romberg) and weight correlates with sway (plus .19 in the 45 degree position, plus .10 in the Romberg). With the single subject there was a decrease of 24 per cent in the total amount of sway. There seemed to be some evidence for a rhythm corresponding to the menstrual cycle of the subject; the beginning of each cycle being characterized by a sharp decrease in the amount of sway. On the introspective side in the case of the one reagent, the equilibration situation was characterized by muscular strain, scattered attention and unpleasant affective elements in the earlier stages; in the later stages the situation was characterized by quiescent attention, relaxation and freedom from bodily concomitants.

A Test for Voluntarо-motor Facilitation. JOHN W. TODD, University of Southern California, Los Angeles.

This experiment was suggested by the writer's study of the facilitation of the reaction reflex, using stimuli of varying intensities, different intervals between successive stimuli and three simultaneous disparate stimuli. The successful production of facilitation under these conditions in the case of the so-called "cerebral reflex" (Cattell) in addition to the earlier and well-known studies of Jendrassik, Lombard, Exner, Fére and others at the reflex-motor levels of lower animals and man, motivated the writer's attempt to discover analogous reënforcement at the voluntarо-motor level. A special apparatus was devised being essentially a compound ergograph of unconnected adjustable units so that work could be done upon them by the contraction of a single finger of either hand, by any two fingers of the same hand or by the simultaneous and alternate contraction of fingers of the right and left hands. The method was to begin in all cases with the *maximal voluntary contraction* of a given flexor muscle and to look for facilitation consequent to the maximal contraction of another unilateral or bilateral flexor muscle. As the apparatus stands, one unit only carrying a stylus and recording dial, it serves to measure the reënforcement as manifested on one side only. Improvement of the apparatus by means of recording devices for both units of the ergograph are expected to make future results more interpretable. The results so far obtained would lead to the expectation that under the conditions of the experiment there is a facilitation effect consequent to the co-contraction of two voluntarо-flexor muscles. Nothing can be stated as yet concerning the amounts of facilitation or the dynamometric range within which it may be found to operate.

The Effect of Attitude on Problem Solving. STELLA B. McCHARLES, University of California, Berkeley.

This was an experiment to determine the effect of certain attitudes on the ability of five groups of subjects to solve problems. One group was given a set of instructions calculated to produce pugnacity, another friendliness, another alertness, a fourth relaxation, and the other no attitude at all except the "Aufgabe." They were asked to solve, while maintaining the attitude, the Yerkes Multiple-choice Problems, standardized and expanded by Florence Whittell; these problems are provided by arranging black disks placed on a

row of twelve white spots. The work was carried on in five 20 minute periods, distributed over two weeks. When they had finished they were asked questions to determine whether they had been able to take and maintain the attitude.

A significant difference was found in the result obtained from the groups, the pugnacity attitude promoting definitely a higher efficiency in solving the problems.

The Measurement of Attitude by Means of Self-Estimation. RAYMOND FRANZEN, University of California, Berkeley.

Thirty-three "interests" were suggested to a class of Juniors at the University of California. These people were first to rate these lines of interest in reference each to himself; next in reference to what each believed to be typical of his university class group; and last in reference to what each believed to be typical for the general group of mankind. The thirty-three interests have three variables for each individual. The intercorrelation of these variables yields an objective measure of attitude, for instance: the correlation between the ratings made of the interest for himself, and those ratings made for what he thinks is ideal for his class group and for the general group, measures the complacency or conceit of the individual. Each man has one of these correlation values. The frequency distribution of these correlations is the distribution for that particular group of the attitude measured.

The importance of this investigation lies in its attempt at gaining an objective method of measuring attitude.

An Experimental Investigation of Proof-Readers' Illusions. H. R. CROSLAND, University of Oregon, Eugene.

An attempt to ascertain the objective and subjective conditions resulting in errors when reading galley proofs,—to discover the relation existing between amount of time spent in reading and the degree of accuracy attained,—and to exhibit the frequencies of 4 common types or error. Galley proof sheets, 20 in number, arranged in four series of five sheets each, properly provided with specified frequencies and types of mistakes, were presented to 30 readers. The reagents, comprising five groups, were Journalism professors, practical printers, Journalism students, Psychology professors, and Psychology students. The four series of readings were seriated for the aims respectively of accuracy, speed, mastery of meaning, and un-

controlled or natural reading. Time was recorded by means of a stop watch.

Results (1) A correlation, of -0.47 or -0.48 , obtains between time spent and degree of inaccuracy, (2) re-readings did not increase accuracy appreciably; (3) in general, the fewness of objective errors in the sheets led to increased percentage of inaccuracy. (4) Accuracy of the different groups of subjects ranked from best to poorest: shows Journalists, Printers, Psychologists, Journalism students, and Psychology students; (5) readers with the greatest familiarity with technical terms (psychological terminology) erred least on such terminology; (6) the extreme right side of the proof sheets and the last half of the sheets showed greatest number of errors.

Group Judgments of Lifted Weights. KATE GORDON, University of California, Southern Branch, Los Angeles.

Is the judgment of a group of persons any better than the judgment of the average individual of the group? In the matter of lifted weights,—Yes.

A series of 10 weights was arranged varying by equal objective steps from 16 grams to 17.6 grams. These intervals were small enough to make individual judgments very uncertain. Each of 200 persons tried to arrange the 10 objects in the correct order of weight. The order arrived at by each individual was correlated with the true order. The mean coefficient or correlation was $.41$. The composite judgment of the first 50 persons was then computed, and this was correlated with the true order with the result that the coefficient was $.94$, the composite order for the second 50 agreed with the true order by $.92$; that of the third 50 by $.92$, and that of the fourth 50 by $.95$. In brief, the group came much nearer to the truth than did the average individual.

The Fakir in Psychology. FREDERICK E. BOLTON, University of Washington, Seattle.

At no time in the history of the world since the days of necromancy and the black art have people been so gullible as at the present moment. This may sound preposterous in an age of such marvelous scientific achievement. The very marvelousness of scientific accomplishment is the explanation.

During the war the psychologists saw their rightful chance for sorting men quickly into occupational groups. They were highly

successful in classifying soldiers and after the war they said, "Why not apply the same methods to peace-time problems?" Their success had been so great during the war that people everywhere were ready to believe anything regarding the realm of mind as in the realm of matter. There is consequently now almost as much of a belief of some wizardry in psychology as there was in astrology in the Middle Ages. But to the multitude psychology means some uncanny clairvoyance or hypnotism. Quacks are making use of this credulity and are reaping great harvests of lucre thereby. Self-styled "psychologists" are giving lectures to large groups of business men on the "Psychology of Success," the "Psychology of Efficiency," etc. "How to Read People on Sight, To Impress Them, Convince, Persuade and Understand Them" is the title of a series of lectures said to have been given to as high as 3000 persons in one city and similar numbers in other places. The audiences were taught "how to know at a glance, the amount of any individual's capacity;—the ideal head for success today; how that leanings and longings which we imagine we conceal from the world are printed, in the shapes of the eyes, mouth, nose, jaw and forehead; and how to discover what has been holding you back." Then there are "memory experts," "will trainers," etc., galore.

The real psychologists are the most modest in their claims regarding psychology. The daily press and the popular magazines contribute sensational and exaggerated accounts purporting to be reports of "distinguished" psychologists. The multitudes read these accounts instead of standard books on psychology. Is it any wonder that the average layman comes to regard this psychological bunk as scientific psychology?

We psychologists and educationists should do everything possible to give a scientific conception of psychology. Whenever a psychological fakir comes to town he should be interviewed and the facts regarding him signed by a committee of reputable psychologists.

Constitutional Psychoses Ending in Permanent Recovery. A. J. ROSANOFF and GLADYS W. BERGMAN, Los Angeles.

This study was undertaken for the verification of a certain phase of a theory of personality arising from psychiatric experience, which had been published previously (*Psychol. Bulletin*, Sept., 1920). According to that theory permanent recovery from manic-depressive and schizophrenic psychoses occurring before the age of twenty-five years is possible as a result of a special course of ontogeny in such

cases. Current psychiatric classifications imply either recurrency, or chronicity, or a deteriorating course as the practically inevitable prognosis.

The material was sought among the admission records of the, now, Brooklyn State Hospital for the years 1880 to 1889. Eventually eight cases were found in which a psychosis had occurred before the age of twenty-five years, ended in recovery, and did not recur during the subsequent lives of the subjects, *i.e.*, during periods of from thirty-one to forty years. The latter fact was determined by follow-up investigations. In five of the cases the psychoses were of manic-depressive nature; in one case a manic-depressive psychosis on top of mental deficiency; in one a mixture of manic-depressive and schizophrenic manifestations; and in one an acute schizophrenic reaction.

No other explanation seems to offer itself of the unusual outcome in these cases, other than a special relative order of ontogenetic development of the different temperamental elements of personality: the "normal" factors are relatively late in maturing, thus permitting the earlier maturing hypostatic (cyclothymic or schizophrenic) factors to become manifest in the form of psychotic behavior. The psychosis ends in recovery as full development of the "normal" factor is attained and is, by the same factor, prevented from again becoming manifest.

From a practical standpoint the material establishes the following proposition: In a constitutional psychosis occurring in the second or third decade of life an unqualified prediction of recurrency, chronicity, or deterioration, based on current prognostic generalizations, is no longer justified.

Some Studies in Suggestion Therapy. KARL T. WAUGH, University of Southern California, Los Angeles.

There are certain groups who at present exalt psychoanalysis to the position of a panacea. They make it appear that the laying bare of concealed complexes to the scrutiny of the practitioner is in itself an infallible cure of all mental and nervous malfunctionings. To the author it seems advantageous to call attention to the prime importance of suggestion, either in its simple form or under hypnotic conditions, as the real therapeutic agent.

There are psychanalysts who insist that never, under any circumstances, do they use suggestion with their patients; but that in every case, under skillful questioning and the use of free associa-

tions as a method of diagnosis, the mind of the patient is liberated from besetting fears, and virtually cures itself. While it is not denied such a clearing up of difficulties may occur in this way, it is contended that the method is limited in its scope to probably those cases in which a fear of disclosure is in itself an element of the pathological complex. There are undoubtedly many cases in which submerged experiences exist where fear of illumination is not of itself an element of the complex. Here something other than analysis is needed to serve as a leverage.

As a matter of fact, suggestion is present even in cases which are cited by the analyst as being purely analytic. (1) The approach of the analyst to his patient is generally with the suggestion that confessions are salutary. The words given to arouse association, whether for controlled or free association, are of themselves suggestions planted in the mind of the patient. (2) As catharsis is not of itself a cure, so the bringing out from their subconscious depths of malignant ideas must be succeeded by the implanting of ideas of a non-malignant character.

The usefulness of suggestion as a therapeutic agency was illustrated by several case histories of patients of different types.

A Study of the Sex Differences in Geometric Abilities. FRANK C. TOUTON, University of Southern California, Los Angeles.

In this study use was made of 2800 plane geometry examination papers written by New York State high school pupils in their Regents examination of June, 1918. The ninety schools from which the papers were selected were among the better schools of the state, and since in the study access was not had to the papers of pupils who failed in the examination as a whole, the findings are based upon work done by the better than average pupils.

The report brought out the following facts:

1. Boys show a decidedly stronger preference than do girls in selecting for solution the construction exercise.
2. The median boy slightly excels the median girl in achievement in solving each of the originals of the list. This difference is not great or even significant, for the individual differences in each sex group far outweigh in importance the differences between the mean scores of the groups.
3. Boys and girls seem to differ no more widely in ability to do one type of exercise than in ability to do another.

4. A correlation coefficient was used to relate the geometric abilities of the sex groups. The highest correlations between being a boy rather than a girl and excelling a girl in the solution of an exercise are found in the solutions of those exercises where the greatest differences in preferences are expressed.

5. In the solutions of the construction exercise, it was found that girls experienced greater difficulty than did boys in distinguishing between the given and the required elements of the problem.

6. In those measures of ability to solve geometric originals which were made in the study, it was found that boys are less variable than girls.

The Extension of the Development School Work in the Los Angeles City Schools. M. FRANCIS MARTIN, Department of Psychology and Educational Research, Los Angeles.

Los Angeles is showing certain growth in the educational work with sub-normal children in spite of the fact that the State of California has failed to assume its rightful responsibility in this matter.

The percentage of sub-normal children in the schools of Los Angeles is found to be higher than that reported in any other city in the country. An estimate based upon an extensive survey by mental tests and the age-grade retardation scale gives the percentage as 4.28 of the school population. In other words, there are approximately 5000 children who are retarded three years or more in mental development.

For these children who are permanently handicapped and obviously cannot succeed in the educational race with the normal children in the regular grades, the Board of Education has established six entire Development Schools and forty-five Development Rooms. The purpose of these special classes is to relieve these children of the abstract mental performances which are beyond them, and to substitute simplified and practical essentials of the academic subjects, motivated by such pre-vocational training and physical activity as will enable these children to become self-supporting citizens when adults.

Parents, principals and teachers are beginning to appreciate the value of such training and are coöperating with us in the further extension of the work.

An Experimental Study of Some Behavior Tendencies of the Potentially Delinquent Boy. A. S. RAUBENHEIMER, University of Southern California, Los Angeles.

The purpose of the study was to attempt to devise a method of analysis whereby some of the delinquent tendencies in boys could be determined prior to the overt expression of such tendencies, or rather, before the crystallization of such tendencies and desires into permanent habits of thought and action.

Seven different exercises were developed by means of which an expression of the boy is obtained regarding his social interests and general activities. Some of the exercises also aim at revealing the character of the boy's statement regarding his own knowledge and abilities.

These exercises were given to groups of boys selected on the basis of their stability, trustworthiness, and healthy-mindedness; and they were taken from communities differing widely in social privileges. Boys from parental schools were taken as a control group.

The results of the experiment showed a remarkable agreement between the differentiation made by the exercises and the original differentiation made by the teachers. It was furthermore possible to discover some of the causal factors operating in the delinquent departure of individual boys. As far as the relation between delinquency and mentality is concerned, it was found that low mentality did not necessarily argue for delinquent development, nor superior mentality for social and moral stability. Other specific factors seemed to act more strongly as final determinants in the development of delinquency.

An Experiment in Teaching Psychology. GERTRUDE S. BELL, State Teachers' College, San Diego.

A class of about fifty sophomores studying general psychology in the State College at San Diego were given a list of ten psychologies with explicit directions for a reading experiment upon material supplementing the regular class work. Each student read for thirty consecutive minutes, each day for thirty days (within five or six weeks) and recorded on a blank given him the time, place, book, number of words per minute and any modifying factors. At the completion of the thirty readings each one tabulated the results of his own readings and represented them in graphic form, with whatever explanation he could make as to the irregularities, gains, or losses.

The experiment resulted in a larger amount and a better quality of reading than had been secured from former classes; a decided increase in rate of reading was almost universal, and probably the greatest gain was in an appreciation for an objective method of studying a very important activity.

Another type of work done by this class was a study of individual differences within the group.

Terman's Group Intelligence test, a number of standard achievement tests, and two brief mid-term tests in psychology were given under standard conditions. The results were tabulated in terms of rank. Each student made a graph showing his own ranks on these various tests and wrote whatever comment or explanation he could.

The lack of reliability of the measures of the special abilities (reading, language, arithmetic, etc.) was appreciated, but that we have here measures of real differences which are significant was the important point.

The greatest gain to these students was thought to be a scientific attitude toward studying one's own abilities in relation to each other and of these abilities in their relation to the same in other individuals.

The study gave them a better understanding of objective methods of attacking and solving psychological problems, as well as a better understanding of themselves.

A Study of Superior Children and Problem Cases, from the Clinical Standpoint. ALBERTINE A. RICHARDS, State Teachers College, San Francisco.

The Influence of Language Mastery in the Tests of the Binet Scale.

MARVIN L. DARSIE, University of California, Southern Branch, Los Angeles.

The Determinant in Educational Counseling. MARY BESS HENRY, Department of Research, Los Angeles.

A Demonstration of Nonreaders. GRACE M. FERNALD, University of California, Southern Branch, Los Angeles.

Factors Governing the Development of Personality. GARDNER C. BASSETT, Dartmouth College, Hanover, N. H.

GENERAL REVIEW
EDUCATIONAL PSYCHOLOGY

BY BIRD T. BALDWIN¹

University of Iowa

1. LEARNING

General tests on learning have been published by Stratton (149) whose purpose was to determine the relative importance of special mental abilities and the transfer of training; Edwards (41) whose text includes many useful suggestions with regard to methods of study; Mead (96) who attempts to summarize all topics in educational psychology, and Pyle (130) who discusses the measurement of learning, the learning curve and individual differences. Burt (17) has published an elaborate text on experimental psychology and child study (to be reviewed later).

Freeland (47) made a detailed study of the daily learning of six children, using typewriting as the art to be learned. He found four factors of importance: interest, physical condition, mental alertness and tenacity. Accuracy and speed showed little relation to each other, and the summer vacation caused a fall in the learning curve. Sturt (150) also used typewriting in an investigation of the relation of speed to accuracy in the learning of twenty girls. She found that if attention was directed solely to accuracy, speed improves gradually, but if attention was directed solely to speed, accuracy diminished. She concludes that it is unwise to demand speed from the very beginning, but a high quality of work should be insisted upon throughout the learning period. Garrett (49) in a series of experiments found that there was an optimum rate of speed for accuracy, below which accuracy increased with speed, and beyond which it fell off slowly. Accuracy of a subject in one type of performance did not mean accuracy in another unless the types were closely related. Hoke (66) presents a study in improvement in typewriting from which he concludes that greater speed and accuracy would result from a rearrangement of the keyboard on

¹ The writer has had the assistance of Lorle I. Stecher, Madorah Smith, and Julia Kirkwood.

principles underlying the touch method with a redistribution of finger loads. He has also analyzed ability in shorthand and presents scales for its measurement.

Interest as a factor in learning has been studied by Thorndike (159) who obtained a correlation of +.46 between the rank given a subject for interest by a college student and the mark received by that student in that subject in comparison to the marks he received in other subjects. Book and Norvell (13) from a study of one hundred and twenty-four college students in four simple kinds of learning conclude that "interest in improvement and belief in its possibility aid adaptation and the formation of new and better methods of work." (p. 354). Arps (6) in a comparison of work done with or without knowledge of results arrived at a similar conclusion. Work without knowledge of results was reported as very deadening. Spencer (145) however found an improvement in the habit practiced without knowledge of results in three out of his four subjects. Sullivan (151) reports on the effect of mood or degree of cheerfulness on the performance of a number of different tests by thirty-seven college and graduate students. He found little or no definite correlation and concludes that mood has an insignificant effect. Wohlgemuth (176) in an experiment including 687 children, found there was no difference between pleasure and "unpleasure" in the effect on memory. Gates and Rissland (51) found the scores of their subjects fell after discouragement by telling them they were doing poorly, and the scores improved after encouragement. This was especially true of the subjects doing most poorly.

Peaks (121) has studied the periodic variations in efficiency, summarizing important studies of the influence of heat, weather, humidity, and time of day or year on efficiency. Some of his conclusions are that there are three periods of physical and mental growth in the school year, one of depression in January to March, two that are favorable in September to December and in March to June. For Martin (94) the attention of school children varies at different hours of the day and is least between one and three p.m.

Prandtl (128) carried out experiments to bring out the difference of mental performance in health and in indisposition caused by vertigo, with the result that reproduction suffered little but impression and retentiveness considerably. Möhrke (102) found that experimentally produced pain has no effect on the performance of even difficult tasks. Pressey (129) has studied the influence of color upon mental and motor efficiency. There was no effect of hue, but in cer-

tain tests a decrease of efficiency under dim and an increase under bright light was apparent.

Eng (42) investigated changes in pulse volume and the respiratory curve during tension and attention, using as subjects boys and girls ten to twelve years old and university students. Taste and smell stimuli causing pleasure and annoyance were used. No correlation was found. Clark (29) has used the solution of problems in the study of silent thinking. He found respiration more rapid and regular as the solution was reached. Other slight vasomotor changes took place.

Morgan (109) found fatigue caused little loss in efficiency in the learning period. Eighteen per cent less of the material studied was retained in the last section than in the first section of the learning period, but this loss was apparent only when the material was partially learned. Recognition of material used in the earlier part of the period was much superior to that used in the later part of the period. B. Johnson (71) studied the effect of fatigue on eleven children by means of blood sugar tests. Wager (164) describes a means of measuring fatigue of the eyes.

Zones of attention are indicated in Griffith's (60) study of the psychology of the audience in which he found that academic grades varied directly with position of student in the room. In the study of memorizing, Woody (178) found oral reading superior to silent reading in the memorization of poems for the majority of individuals studied. Robinson (134) found that the relative merits of distributed and concentrated study of numerical material depends upon the total amount studied, the units into which it was divided, and the stage at which efficiency was tested. This was true for either accuracy or for time of recall. Achilles (1) has made an intensive study of recall and recognition, and finds a low but positive correlation between the processes, and low correlations for recall or recognition of different materials. Both processes increase with age, and women and girls are slightly superior to men and boys. Skaggs (142) using nonsense syllables and poetry for material favors the interspersed method of reading and recitation rather than methods of grouping. Mibai (99) has found that the number of readings saved in relearning for each successive number of repetitions is nearly constant. Robinson and Heron (135) studied the effect of variations in length of material on memorizing by the use of nonsense syllables, and found with increasing length of material a negative acceleration in the memory curves. Laird, Remmers, and

Peterson (81) studied organization and classification of material as an aid to memorizing, and concluded that it is probably more beneficial, the more meaningful the material. Winzen's (175) experiments showed that priority of position of two ideas to be associated is of advantage for retention, and concludes that in writing vocabularies to be learned the foreign word should be placed to the right of the native word. H. F. Adams' (2) study on the effect of climax and anti-climax on memory, in which he found the anti-climax order more effective, though made especially with reference to advertising, has a bearing on the learning process. Gilliland (54) concluded that a rapid rate of silent reading aided recall.

Haught (62) has studied the interrelation of some higher learning processes and concluded that the correlations found could be accounted for by common elements in the tests. Thorndike (162) has investigated the permanence of school learning by comparing the ability on algebraic tests of college graduates and freshmen.

Piaget (126) and Winch (173) have both made extensive studies of children's reasonings. Winch has found positive correlations of reasoning ability with age and school grading. Piaget believes the appearance of formal reasoning coincides with the stage of reflection at about eleven years.

Mather and Kline (95) have studied the psychology of solving puzzle problems, and hold that the part method is superior because there is less chance for retroactive inhibitions. Peterson (125) has studied the factors of frequency and recency in learning. He finds little relation, in the case of frequency, and none in the case of recency, to the rightness of the response. O'Brien (114) has investigated the effect of twelve different modes of presentation upon learning. He found in the stage of orienting vocimotor imagery was much used and manumotor imagery did not aid. Zillig (181) makes applications to education of different types of imagery. He believes very strong imagery is often mistaken for intelligence.

Race (131) has made extensive studies of the intercorrelations of improbability and its relation to initial ability, which indicate that improbability is specialized, and greatest for those with greatest initial ability, and that children of average ability improve more rapidly in school subjects than do those who are subnormal. Thompson (157) in an experiment in correlation and transfer shows that the correlation coefficient is no criterion for the amount of transfer to be expected. Real transfer effects may be greater than those measured by the experiment.

2. TECHNIQUE OF TEACHING AND STUDY

Recent texts on methods of teaching are by Hartman (61) who treats of the scientific basis of education and the educative process which is interpreted as social; Coursault (32) who divides his material into the individual, the social, and the educational process; Demoor and Jonckheere (37) who conceive of education as a branch of biology; Nunn (112) who makes a new synthesis of current philosophical, psychological and biological conceptions of education, and takes into consideration recent research in these fields; Mackie (93) who edits a collection of studies dealing with the aims of schooling, nature of teaching, the school system, testing results, community life, and other topics; Lapie (82) who treats of the psychological principles of pedagogic method; Cubberley (33) whose contribution is in reality a "job analysis" of the work of the principal; Burton (18) who deals more particularly with the subject from the supervisory standpoint; Miller (100) who has written on methods of directing study; Parker (119) who deals with types of elementary teaching and learning and includes a digest of investigations and best known methods; and Adams (3) who discusses the various new methods and motives in education.

Charters' (27) text on curriculum construction is based on the aim of providing for the functioning of educational ideals in daily activity. It includes a digest and criticism of the scientific studies which have been made in the field of the curriculum. The report of the London Consultative Committee (132) in the differentiation of the curriculum for boys and girls includes a moderately complete section on the anatomical, physiological, psychological and social differences between adolescent boys and girls.

Teriman (154) in collaboration with several others has published a text showing different kinds of school reorganization that have resulted from intelligence testing. Brooks (14) shows the value of mental and educational tests in the supervision of rural schools. Whipple (171) and Edmondson (40) have published texts on problems in educational psychology and secondary education which resemble somewhat the new case method used in law schools. Monroe (108) has written a text on the theory of educational measurements, in which he discusses their nature and meaning, their construction, the theory underlying types of responses, and defines norms presenting an outline for making a critical study of a text. McCall has written two texts on measurement and experimentation in education. In the first (89) he aims to present some successes in the science of

measurement, to help the movement of making teaching a profession, to meet the needs of educators, and to bring together the techniques needed in mental measurement. The second book (90) he has written for the purpose of presenting the methodology of education experimentation in a practical form. This treats of the problem, method, and subjects, control of experimental conditions, experimental measurements and computations. Dickson's (38) work on mental tests is an outgrowth of experimentation and offers solutions to a large number of specific problems that arise in a classroom. Hines (65) writes on the same subject treating it more from an historical and informative viewpoint. Other texts have been published by O'Shea (116), Cameron (23), Davis (36), Nutt (113), Foster (45), H. C. Miller (101), and Ruediger (138).

A summary of the work done in experimental education in the United States in the years 1921 and 1922 has been published through the Bureau of Education by Baldwin (7) with the assistance of Smith. The United States Bureau of Education has published bibliographies of two types of teaching now prominent in the discussions of method, giving descriptions of their workings. Not many real experiments have been tried out to prove their worth.

Taylor (152) has compared thirty lessons taught by the socialized method with those that were teacher-directed and found the socialized classes gave better results. McCall, Chassell, and Hollingsworth (91) comparing traditional and free groups in the first grade found that the traditional made less progress in seven tests and more in three tests and in the second grade less progress in four and more in one test, but the differences were very slight.

A comparison of the lecture method with the question and answer method tried in eleven high schools, is reported by Alderman (4). Two studies by Holton (67) and Horne (68) on methods of presenting matter to college students both favored the discussion method. Hunter (70) compared the textbook, lecture, and developmental methods. He also compared oral developmental with laboratory manual and found the first method superior. Kiebler and Woody (76), and Cooprider (31) experimented with laboratory versus demonstration methods in teaching science.

Weber (168) has studied the effectiveness of visual aids in seventh grade instruction by using four methods of presenting subject matter,—films, film-lecture, oral and printed descriptions. The film method was superior only when the subject matter was largely

descriptive, and the method's effectiveness measured by the ability to give the information by drawing.

Monroe (104) has made a study of the types of learning required in different school subjects and their relative difficulty, both from the standpoint of the pupil and in reference to instruction. Monroe and Mohlman (106) find errors made by students in a type of learning discussed above are due to faulty methods of study or faulty technique in utilizing information, and conclude that high school students needed training in the technique of study. Monroe and Carter (105) have studied different types of thought questions.

Webb (166) investigated the habits of study of college students and found superior students used good methods more than do poor students, but the majority of good methods are not used by the majority of students.

Porter (127) reports on the effects of segregation by sex, on scholarship in a Detroit high school. He found the boys' marks showed 8 per cent improvement and the girls were lowered 18 per cent when the sexes were separated. These marks showed closer correlation with intelligence tests than did the marks before separation. The relation of size of class to school efficiency has been studied by the University of Illinois Bureau of Educational Research (163). Very little difference was found between the work of large and small classes in either elementary or high school. Davis (35) also reports that there was no necessary connection between the size of class and efficiency of instruction as measured by pupils' grades. Monroe (103) also found very little relation between sectioning a class and the effectiveness of instruction. Burtt, Chassell, and Hatch (19) found that nothing was gained in the cases of high and low section elected on the basis of intelligence tests over sections not thus selected, unless the rate of progress of the two sections was changed. Laird (80) reports on the influence of sectioning on achievement. He found the 9 o'clock section achieved more than the 11 o'clock section and showed greater improvement. Monroe (107) reports a study on the better construction of written examinations.

3. PRE-SCHOOL EDUCATION

In the early education of children, we find a strong movement toward nursery schools. Owen (118) discusses the various aspects of the movement in England. Chapters are devoted to the study of the child mind, education, and the hygiene of the school. McMillan

(88) also describes the nursery school in England dealing with its scope, purpose, equipment and the training of teachers for it.

Johnson (72) gives an account of a nursery school in New York for children one and one-half to three years old, describing its equipment and procedure and giving excerpts from the daily records. Farley (43) and Woolley (180) both tell of the Merrill-Palmer nursery school, Farley describing the daily procedure and Woolley showing the importance of educational systems reaching down to very early childhood since reactions set up at this period may become the determining factors in later life. Stanton (146) and Scott (141) give summaries from the teacher's daily notes of work done with two groups of children.

Blackburn (11) has experimented for four years using Montessori materials with children of three to seven years in a large school. She gives suggestions concerning the materials and for keeping records of each child's progress, describes experiments in reading, writing, and number work; and a method of class organization in which the children were divided vertically into groups including children of all ages from three to seven.

Peters (123) has compared the progress of kindergarten and non-kindergarten groups in elementary school and finds the former groups saved 3.4 months on an average from which he concludes that the kindergarten expedites school life.

4. MORAL DEVELOPMENT

Books of character training in childhood have been published by Haviland (63), O'Shea (117), and Patri (122). The divisions of Bryant's (16) work on moral and religious education treat of self-liberation by self-realization, the moral ideal, the religious ideal, and the reasoned presentation of religious truths. Rogers (136) stresses the importance of habit formation in the kindergarten age and the value of making an inventory of desirable habits as a guide. The Iowa plan of character education which was awarded a \$20,000 prize by the Character Education Institution (26) points out ways of securing moral results by the use of problems and projects, and includes rating scales for the measurement of character.

There have been several books and articles written emphasizing the importance of the pre-school age in character formation. White (172) gives a detailed treatment of the process of emotional development by which a child should be helped to grow from a homosexual, egocentric creature to a social being. Mulford (111) believes the

child brain is in structure and activity an animal brain but born to be developed into a man brain. Hence the child mind is a primitive mind. Forsyth (44) differentiates three stages in the early development of the infant mind. Green (58) urges the use of psycho-analysis in the classroom and treats of its theory and method.

Gesell (53) has several articles stressing the importance of the pre-school period, which he declares deserves special attention because of its position of priority, the rapid physical growth of children at this age, their great susceptibility to disease, excessive mental development and present legal status.

Thom (156) describes habit clinics to deal with children who are developing undesirable habits and to help them find methods of meeting their problems which will tend to their proper development. He report several case histories. Taylor (153) gives a large number of case histories of children found in a mental health survey whose homes had a bad influence on their character development, showing the undesirable effect of the homes and listing defects and bad conditions found in 190 children.

E. A. Leonard (83) from the reminiscences of adults and instances offered by boys and girls in a Junior high school has classified the causes of children's lies into: A. Intellectual deflections which include (1) exaggerations and (2) imagination; B. Emotional impulses from (1) fear, (2) wish to protect others, and (3) desire for praise or sympathy; and, C. Wilful inventions to gain one's own way. Foucault (46) has collected a large number of lies told by children under six and argues that such false assertions are due to erroneous belief and faulty childhood logic.

Tests of moral knowledge have been published by McGrath (92) with separate norms for Catholic and public school children. In her account of the results obtained from these tests on 4000 children, she includes teachers' and children's rankings for frequency of different faults, the ages of appearance and disappearance of moral problems, and an account of the moral principles of children.

5. SPECIAL SUBJECTS

In the field of speech a book by Calzia (22) discusses methods and instruments used in the experimental study of phonetics, gives a summary of the facts discovered about the properties of speech and voice and points out the applications that can be made to correcting speech defect, instructing the dumb, and teaching foreign languages. Merry (98) gives a survey of the nature of research in speech edu-

cation. Woolbert (179) writing on the effects of the various modes of public reading, deals with changes in pitch, time, quality, and intensity. Anderson (5) reports an experimental analysis of the causes of stuttering carried on by a series of tests used with "normals," ex-stutterers and stutterers. Ex-stutterers were unusually irregular in complex reaction-time. Rapidity and regularity of tapping and disturbance in type of hand coördination seemed to be associated with improvement in stuttering. Starr (147) by means of about 1300 salivary analyses and psychological diagnostic judgments found that 73.7 per cent of stammerers were sub-breathers with a salivary pH considerably below normal; 15.4 per cent were distinctly psychopathic with a salivary pH above normal and the others were hyperexcitable or combinations of the other types. Blanton (12) quotes statistics as to the prevalence of speech disorders, discusses the types of disorder, and urges more attention to speech corrections.

Textbooks on the teaching of reading based on scientific investigations have been published by Germane and Germane (52), Stone (148), W. Smith (144) and Leonard (84). Part II of the Twentieth Yearbook of the National Society for the Study of Education was devoted to the subject of Silent Reading. Buswell (20) by the method of photographing eye-movements has arrived at important conclusions which are reported in three different monographs. He has found that good readers differ from poor readers in the length of eye-voice span, in the number and duration of fixation pauses, and in the relative length of eye-voice span in different parts of the sentence. In collaboration with Judd (74) he analyzed the various types of silent reading, comparing eye-movements in skimming, careful reading, and study; and in the reading of different types of material. The records showed that effort results in a narrowing of the span of recognition, lengthening of the fixation, regressive movement, although some pupils seem unable to change the level of attention. In his third study, Buswell (21) traces the development of the reading habits from the beginning to maturity. He concludes such development proceeds by the reduction of the number and length of fixation pauses and of regressive movements. A comparison is made of different methods of reading, and individual cases are analyzed and the remedial exercises are described which were used in those cases where the pupils had apparently deviated too far from the usual route to indicate probable attainment of efficiency. The psychology of reading with special reference to dis-

ability has also been studied by several investigators. A. I. Gates (50) includes spelling in his study in which he has attempted to devise a technique for diagnosis, to discover the factors in acquiring ability in reading and spelling, to ascertain the causes for disability in these lines, and to try out remedial measures. The defects found to be associated with disability were those of mental ability, vision, articulation, eye-muscular control, eye-movements, eye-voice span, training, emotional stability, and also disinclination. He found no evidence for word blindness. W. S. Gray (57) reports in detail the diagnosis and remedial treatment of 27 pupils backward in reading. C. T. Gray (56) in his monograph on deficiencies in reading analyzes reading ability, gives a compilation of tests and methods of observation to be used for diagnosis which include tests for vocalization, eye-movements, and breathing as well as the more usual reading tests. O'Brien (115) carried out a controlled experiment in different types of training in rapid silent reading. Photographic records of eye-movements show that improvement was accompanied by a reduction in the number of fixation pauses and regressive movement, but by little change in the length of pauses. Bruhn (15) in an attempt to trace the development of literary talent has made a careful study of the spontaneous composition of pupils eleven to twenty years old of both sexes particularly analyzing the substantive used, subjects chosen and extent of imagination. King and Thompson (77) have used similar material in the study of the resources of children's imaginations and found a large proportion of the 1500 children studied were lacking in imagination and another large group showed too strong a morbid element. Wheeler (170) has analyzed the literary appreciation of poetry and believes the fundamental factors are continuity of thought, unity of mood, and rhythm. Currier (34) from five years experimentation concludes that phonetic drills have a real value but are not essential to every child, and that word pronunciation drills have much value, but that no one system is best for all.

Peters and McClure (124) from a study in written versus oral spelling in both study and recitation, concluded that the written methods was preferable for the majority of pupils. If the best method proves to differ from different pupils it may be necessary "to segregate our pupils according to the forms by which they learn best in addition to—or perhaps instead of—our present segregation on the basis of general intelligence." Greene (59) finds a

very slight superiority in the use of syllabication in teaching spelling.

Freeman (48) has summarized the principles of teaching handwriting and has made a study on the handwriting movement by means of an analysis of the movements of good and poor writers through motion picture study and measurement of the amount of arm movement. He found good writers showed a looser grasp of the pen, held the arm more nearly perpendicular to the writing and the forefinger lower than the thumb with wrist tilted not more than 45 degrees, but he found no evidence that the good writers used arm movement more than the poor writers. The good writer adapts the speed to the stroke, the speed being greater at the middle than at the beginning or end of the stroke, but there is no sharp contrast in speed. West (169) found imposed rhythm an aid only in early years. For a writer with habituated speed the rhythm would be slowed and the quality of his writing lowered by any beat slow enough to be consciously followed. Barton (8) has studied the relative value of using small or large units in learning to typewrite. His results are somewhat in favor of the larger unit. Menzel (97) has compared the touch and sight methods and found in the first ten weeks the former method was faster in copying, but by the end of twenty weeks it was almost overtaken by the latter. Heinitz (64) has studied errors in typewriting.

Thorndike (160) has published a text on the psychology of arithmetic. In this book he discusses the function of bonds, control of the response connections, means of obtaining and of measuring improvement in their function, desirable degree of strength of bonds at different stages of learning, the original tendencies on which the school may base its connection forming, application of laws of learning, and inheritance of special abilities. Another text on the psychology of arithmetic is by Drummond (39). In algebra Thorndike (158) finds a positive correlation among the abilities involved in algebraic computation and problem solving. Thorndike (161) has also studied the effect of changed data upon reasoning and finds the percentage of wrong answers when customary associations were favored 19.8 per cent less than when they were not favored. Smith (143) has determined the relative difficulty of arithmetical combinations for each of the four fundamental operations where measured by the time required for recall. Terry (155) has investigated the reading problem in arithmetic through an examination of the methods of adults by means of introspective

reports, time and quantity records and photographic records of eye-movements. Knight (78, 79) calls attention in his analysis of arithmetic drills to the necessity of constructing drills so that each constituent element may receive a due amount of practice. Two studies are reported on the correlation of visual imagery with geometric ability. Wood and Bell (177) found some correlation but a lower correlation than between geometric ability and (a) immediate recall, or (b) verbal expression, or (c) absence of motor manifestation. Washburn, Hatt, and Holt (165) found good correlations especially with speed in control of visual imagery. The relative value of the additive and borrowing methods in teaching subtraction have been studied by Beatty (9) and Winch (174). Beatty concludes from his data that the Austrian method does not show real superiority over the borrowing method and Winch that it is of decided advantage only with children not previously taught by the other method for the gain he found was not sufficiently great to justify a change of method. Collar's (30) analysis of the arithmetic ability of 200 boys shows that it may be represented in two main subdivisions—power to compute and power to do work involving the application of higher forms of mental activity. He believes that there is an "essential unity in arithmetical ability." Saladini (139) has also studied special ability for mathematics and concludes that children showing such aptitude are pupils of marked intelligence, of a more lively disposition than the average and are quite conscious of and pleased with their ability. The capacity is frequently hereditary and not infrequently associated with artistic ability. Chaslin (28) through the study of the psychology of mathematics as found in the works of psychologists and mathematicians has investigated the problem of reasoning.

Luquet has published three articles on children's drawing. One (86) is an historical summary of methods employed in the study of children's drawing. Another (87) is a discussion of one type of drawings of the human figure in which head, legs, and arms are represented but not the trunk. In the third (85) he compares children's drawings with paleolithic art, and traces the stages in evolution of drawing in the child. An important stage is reached when the infant first realizes he is making a representation of a mental image. Katz and Breed (75) have attempted to determine the factors on which the color preferences of children from kindergarten up are based. Berlinde (10) has written on the aesthetic conceptions of school children. Twenty-two series of aesthetic values have

been used by Reymert (133) in a series of experiments to determine some factors of aesthetic judgment. Jones (73) gave tests to seventh and eighth grade children and sent a questionnaire to over 200 artists in an attempt to discover the native powers peculiar to children who have art ability. He found art ability and aesthetic appreciation to be closely linked and noted high correlations between the tests of visual memory and perception of perspective with drawing ability. Scharfe (140) and Pauli (120) have studied drawing ability in young children. Scharfe gives criteria for the evaluation of free drawing especially by observation of line, form, and rhythm.

Morrison and Webb have made studies of methods that bear on the learning of a foreign language. Morrison (110) from his study of Latin or French concludes that transfer from lesson learning to capacity is very uncertain and occurs in a small percentage of cases. Webb (167) reports a comparison of two methods of study—recall or study, in learning paired associates. He found 65 per cent to 76 per cent of his subjects retained more and 16 per cent to 24 per cent less by the recall method. Writing down the paired associates helped 57 per cent and hindered 38 per cent. In Latin many studies have centered around the investigations being carried on by the American Classical League (55) with the support of the General Education Board in order to determine "to what extent the objectives commonly claimed for Latin are attained" and what content and methods are most favorable.

In formulating a program of social studies in the elementary and secondary school, Rugg (137) has collected sixteen papers in the Twenty-Second Year Book of the National Society for the Study of Education.

REFERENCES

1. ACHILLES, E. M. *Experimental Studies in Recall and Recognition*. Arch. of Psychol., No. 44, 1920, 6. Pp. 80.
2. ADAMS, H. F. The Effect of Climax and Anti-climax Order of Presentation on Memory. *J. of Appl. Psychol.*, 1920, 4, 330-338.
3. ADAMS, J. *Modern Developments in Educational Practice*. London: Univ. of London Press, 1922. Pp. 302.
4. ALDERMAN, G. H. The Lecture Method Versus the Question and Answer Method. *Sch. Rev.*, 1922, 30, 205-209.
5. ANDERSON, L. O. A Preliminary Report of an Experimental Analysis of Causes of Stuttering. *J. of Appl. Psychol.*, 1921, 5, 340-349.
6. ARPS, G. F. Work with Knowledge of Results Versus Work without Knowledge of Results. *Psychol. Monog.*, 1920, 28, No. 3. Pp. 41.
7. BALDWIN, B. T., & SMITH, M. E. *Educational Research*. Washington: Bureau of Education Bulletin No. 42, 1923. Pp. 76.

8. BARTON, J. W. Smaller Versus Larger Units in Learning to Typewrite. *J. of Educ. Psychol.*, 1921, 12, 465-474.
9. BEATTY, W. W. The Additive Versus the Borrowing Method of Subtraction. *Elem. Sch. J.*, 1920, 21, 198-200.
10. BERLINDE, F. Den Estetiska Uppfattningen hos Skolungdom (II) Svenskt. *Ark. f. Ped.*, 1920, 8, 56-96.
11. BLACKBURN, M. *Montessori Experiments in a Large Infants School*. New York: E. P. Dutton & Co., 1921. Pp. 143.
12. BLANTON, S. Speech Defects in School Children. *Ment. Hyg.*, 1921, 5, 820-827.
13. BOOK, W. F., and NORVELL, L. The Will to Learn. *Ped. Sem.*, 1922, 29, 305-362.
14. BROOKS, S. S. *Improving Schools by Standardized Tests*. Boston: Houghton Mifflin, 1922. Pp. 278.
15. BRUUN, K. *De växandes estetiska liv, med särskild hänsyn till de litterära intressernas utveckling*. Vasa, Finland: A. B. Fram's Forlag, 1920, Vol. I, Pp. x+299; 1921, Vol. II, Pp. vii+314.
16. BRYANT, S. *Moral and Religious Education*. London: Arnold, 1920. Pp. 264.
17. BURT, C., & OTHERS. *Experimental Psychology and Child Study*. London: Pitman, 1922. Pp. i+122.
18. BURTON, W. H. *Supervision and the Improvement of Teaching*. New York: Appleton, 1922. Pp. 510.
19. BURTT, H. E., CHASSELL, L. M., & HATCH, E. M. Efficiency of Instruction in Unselected Sections in Elementary Psychology Compared with that in Sections Selected on Basis of Intelligence Tests. *J. of Educ. Psychol.*, 1923, 14, 154-161.
20. BUSWELL, G. T. *An Experimental Study of the Eye-voice Span in Reading*. Supplementary Educational Monograph No. 17. University of Chicago, 1920. Pp. xii+106.
21. BUSWELL, G. T. *Fundamental Reading Habits: A Study of their Development*. Supplementary Educational Monographs, No. 21. University of Chicago, 1922. Pp. xiv+150.
22. CALZIA, G. P. *Experimentelle Phonetik*. Berlin and Leipzig: Sammlung Goeschen. Pp. 135.
23. CAMERON, E. H. *Psychology and the School*. New York: Century Co., 1921. Pp. 339.
24. CAMPBELL, C. M. Psychology of the Pre-school Child. In *American Child Hygiene Association, Report of the Proceedings of the twelfth annual meeting*, New Haven, Conn., 1921, 137-144.
25. CARR, W. L., & GRAY, M. D. The Classical Survey. *Classical J.*, 1921, 17, 16-27.
26. Character Education Methods. *The Iowa Plan, \$20,000 award, 1922*. Washington, D. C.: Character Education Institution, 1922. Pp. vii+46.
27. CHARTERS, W. W. *Curriculum Construction*. New York: Macmillan, 1923. Pp. 352.

28. CHASLIN, P. Quelques Mots sur la Psychologie de la Mathématique Pure. *J. de Psychol.* 1922, 19, 673-694.
29. CLARK, R. S. *An Experimental Study of Silent Thinking.* Arch. of Psychol., 1922, 7. Pp. v+101.
30. COLLAR, D. J. A Statistical Survey of Arithmetical Ability. *Brit. J. of Psychol.* 1920, 11, 135-158.
31. COOPRIDER, J. L. Laboratory Methods in High School Science. *Sch. Sci. and Math.*, 1923, 23, 526-530.
32. COURSAULT, J. H. *The Principles of Education.* Boston: Silver, Burdett, 1920. Pp. 468.
33. CUBBERLEY, E. P. *The Principal and his School.* Boston: Houghton Mifflin, 1923. Pp. 571.
34. CURRIER, L. B. Phonics and no Phonics. *Elem. Sch. J.*, 1923, 23, 448-452.
35. DAVIS, C. O. The Size of Classes and the Teaching Load in the High Schools Accredited by the North Central Association. *Sch. Rev.*, 1923, 31, 412-419.
36. DAVIS, S. E. *The Technique of Teaching.* New York: Macmillan, 1922. Pp. viii+346.
37. DEMOOR, J., & JONCKHEERE, T. *La science de l'éducation.* (2nd Ed.) Paris: Alcan, 1922. Pp. 320.
38. DICKSON, V. E. *Mental Tests and the Classroom Teacher.* Yonkers-on-Hudson, New York: World Book Co., 1923. Pp. xv+231.
39. DRUMMOND, M. *The Psychology and Teaching of Number.* World Book Company, 1922. Pp. 126.
40. EDMONDSON, J. B. *Problems in Secondary Education.* Bloomington: Public School Publishing Co., 1923. Pp. 85.
41. EDWARDS, A. S. *The Fundamental Principles of Learning and Study.* Baltimore: Warwick & York, 1920. Pp. 240.
42. ENG, H. *Experimentelle Untersuchungen über das Gefühlsleben des Kindes im Vergleich mit dem des Erwachsenen.* Leipzig: J. A. Barth, 1922. Pp. iv+258.
43. FARLEY, B. The Merrill-Palmer Nursery School. *Child Welfare Mag.*, 1922, 17, 101-104.
44. FORSYTH, D. The Rudiments of Character. A Study of Infant Behavior. *Psychoanal. Rev.*, 1921, 8, 117-143.
45. FOSTER, H. H. *Principles of Teaching in Secondary Education.* New York: Scribner, 1921. Pp. 367.
46. FOUCault, M. Assertions d'Enfants. *J. de Psychol.* 1923, 20, 1-11.
47. FREELAND, G. E. A Year's Study of the Daily Learning of Six Children. *Ped. Sem.*, 1921, 28, 97-115.
48. FREEMAN, F. N. The Scientific Evidence on the Handwriting Movement. *J. of Educ. Psychol.* 1921, 12, 253-270. (For a summary of the principles of teaching see: *How to Teach Handwriting*, FREEMAN & DOUGHERTY. N. Y.: Houghton Mifflin, 1923, Pp. 305.)
49. GARRETT, H. E. *A Study of the Relation of Accuracy to Speed.* Arch. of Psychol., No. 56, 1922, 8. Pp. 104.
50. GATES, A. I. *The Psychology of Reading and Spelling, with Special Reference to Disability.* New York: Teachers College, Columbia University, Contributions to Education, No. 129. No. 106.

51. GATES, G. S., & RISSLAND, L. Q. The Effect of Encouragement and of Discouragement upon Performance. *J. of Educ. Psychol.*, 1923, 14, 21-26.
52. GERMANE, C. E., & GERMANE, E. G. *Silent Reading: a Handbook for Teachers*. New York: Row, Peterson, 1922. Pp. 383.
53. GESELL, A. Pre-school Hygiene of Handicapped Children. *Ped. Sem.*, 1922, 29, 232-246.
54. GILLILAND, A. R. The Effect of Rate of Silent Reading on Ability to Recall. *J. of Educ. Psychol.*, 1920, 11, 474-479.
55. GRAY, M. D., & CARR, W. L. The Classical Investigation by the American Classical League with the Support of the General Education Board. *J. of Educ. Res.*, 1921, 4, 332-333.
56. GRAY, C. T. *Deficiencies in Reading Ability; their Diagnosis and Remedies*. New York: Heath, 1922. Pp. 420.
57. GRAY, W. S., & OTHERS. *Remedial Cases in Reading; their Diagnosis and Treatment*. Chicago: University of Chicago Press, Supplementary Educational Monographs, No. 22, 1922. Pp. 208.
58. GREEN, G. H. *Psychanalysis in the Classroom*. London: Hodder & Stoughton, 1921. Pp. 288.
59. GREENE, H. A. Syllabication as a Factor in Learning to Spell. *J. of Educ. Res.*, 1923, 8, 208-219.
60. GRIFFITH, C. R. A Comment upon the Psychology of the Audience. *Psychol. Monog.*, 1921, 30, No. 136, 36-47.
61. HARTMAN, G. *The Child and his School*. New York: Dutton, 1922. Pp. xi+248.
62. HAUGHT, B. F. The Interrelation of Some Higher Learning Processes. *Psychol. Monog.*, 1921, 30, No. 139. Pp. 70.
63. HAVILAND, M. S. *Character Training in Childhood*. Boston: Small, Maynard, 1921. Pp. 296.
64. HEINITZ, W. Untersuchungen über die Fehlleistungen beim Maschinen-schreiben. *Zeits. f. angew. Psychol.*, 1921, 18, 33-49.
65. HINES, H. C. *Measuring Intelligence*. Boston: Houghton Mifflin, 1923. Pp. xii+146.
66. HOKE, R. E. *The Improvement of Speed and Accuracy in Typewriting*. Baltimore: The Johns Hopkins University. Studies in Education, No. 7, 1922. Pp. 42.
67. HOLTON, E. L. A Study of Methods of Presenting Subject Matter to Undergraduates in College. *Sch. & Soc.*, 1920, 11, 58-59.
68. HORNE, H. H. University Students on the Discussion Method. *Sch. & Soc.*, 1922, 16, 218-221.
69. HOSKIN, J. F. *Empirical Studies in School Reading*. New York: Teachers College, Columbia University, Contributions to Education, No. 114, 1921. Pp. 174.
70. HUNTER, G. W. An Experiment in the Use of Three Different Methods of Teaching in the Classroom. *Sch. Sci. and Math.*, 1921, 21, 875-890, 1922, 22, 20-32.
71. JOHNSON, B. Fatigue Effects as Measured by Sugar Content of Blood. *J. of Comp. Psychol.*, 1922, 2, 155-171.

72. JOHNSON, H. M., & REUBEN, C. S. *A Nursery School Experiment.* New York: Bureau of Educational Experiments, 1922. Pp. 81.
73. JONES, E. E. The Correlation of Visual Memory and Perception of Perspective with Drawing Ability. *Sch. & Soc.*, 1922, 15, 174-176.
74. JUDD, C. H., & BUSWELL, G. T. *Silent Reading; A Study of the Various Types.* University of Chicago: Supplementary Educational Monographs, No. 23, 1922. Pp. xiii+160.
75. KATZ, S. E., & BREED, F. S. The Color Preferences of Children. *J. of Appl. Psychol.*, 1922, 6, 255-266.
76. KIEBLER, E. W., & WOODY, C. The Individual Laboratory Versus the Demonstration Method of Teaching Physics. *J. of Educ. Res.*, 1923, 7, 50-58.
77. KING, E. M., & THOMPSON, J. The Resources of Children's Imagination. *J. of Exper. Ped.*, 1920, 5, 288-294.
78. KNIGHT, F. B. An Analysis of Multiplication Drill. *J. of Educ. Res.*, 1923, 8, 199-207.
79. KNIGHT, F. B. Drill in Arithmetic. *J. of Educ. Psychol.*, 1923, 14, 115-122.
80. LAIRD, D. A. A Study of the Influence of Sectioning Students upon their Achievement. *J. of Educ. Psychol.*, 1923, 14, 143-153.
81. LAIRD, D. A., REMMERS, H., & PETERSON, L. J. An Experimental Study of the Influence of Organization of Material for Memorizing upon its Retention. *J. of Exper. Psychol.*, 1923, 6, 69-81.
82. LAPIE, P. *Pedagogie Francaise.* Paris: Alcan, 1920. Pp. 216.
83. LEONARD, E. A. A Parent's Study of Children's Lies. *Ped. Sem.*, 1920, 27, 105-136.
84. LEONARD, S. A. *Essential Principles of Teaching Reading and Literature.* Philadelphia: Lippincott, 1922. Pp. 460.
85. LUQUET, G. H. Genèse de l'art Figuré. *J. de Psychol.*, 1922, 19, 695-719, 795-831.
86. LUQUET, G. H. La Méthode dans l'Étude des Dessins d'Enfants. *J. de Psychol.*, 1922, 19, 193-221.
87. LUQUET, G. H. Les Bonshommes têtards dans le Dessin enfantin. *J. de Psychol.*, 1920, 17, 684-710.
88. McMILLAN, M. *The Nursery School.* New York: Dutton, 1919. Pp. 356.
89. McCALL, W. A. *How to Measure in Education.* New York: Macmillan, 1922. Pp. xii+416.
90. McCALL, W. A. *How to Experiment in Education.* New York: Macmillan, 1923. Pp. xiv+281.
91. McCALL, W. A., CHASSEL, L. M., HOLLINGWORTH, L. S. Experimental Measurements. *Teachers Coll. Record*, 1919, 20, 218-228.
92. McGRATH, M. C. *A Study of the Moral Development of Children.* Psychol. Mono. No. 144, 1923, 32. Pp. 190.
93. MACKIE, A. *The Groundwork of Teaching.* Sidney, N. S. W.: Teachers' College Press. Pp. 167.
94. MARTIN, R. L'attention chez les élèves. *Bull. de la Soc. Alf. Binet*, Nos. 156 and 157, 1922, 22, 85-100.

95. MATHER, J. E., & KLINE, L. W. The Psychology of Solving Puzzle Problems. *Ped. Sem.*, 1922, 29, 269-282.
96. MEAD, A. R. *Learning and Teaching*. New York: Lippincott, 1923. Pp. 277.
97. MENZEL, M. Beiträge zur Psychotechnik der Schreibmaschine und ihrer Bedienung. *Prak. Psychol.*, 1921, 2, 268-274.
98. MERRY, G. N. Research in Speech Education. *Quar. J. of Speech Educ.*, 1921, 7, 97-108.
99. MIBAI, S. The Effects of Repetition upon Retention. *J. of Exper. Psychol.*, 1922, 5, 147-151.
100. MILLER, H. L. *Directing Study*. New York: Scribner, 1922. Pp. 378.
101. MILLER, H. C. *The New Psychology and the Teacher*. New York: Seltzer, 1922. Pp. 225.
102. MÖHRKE, W. Beitrag zur Untersuchung der Schmerzempfindung. *Arch. f.d. ges. Psychol.*, 1921, 42, 97-131.
103. MONROE, W. S. *Relation of Sectioning a Class to the Effectiveness of Instruction*. Urbana: University of Illinois, Bureau of Educ. Res. Bull., No. 11. 1922. Pp. 18.
104. MONROE, W. S. *Types of Learning Required of Pupils in the Seventh and Eighth Grades and in the High School*. Urbana: University of Illinois Bulletin, Vol. 19, No. 15, 1921. Bureau of Educ. Res. Bull., No. 7, Pp. 16.
105. MONROE, W. S., & CARTER, R. E. *The Use of Different Types of Thought Questions in Secondary Schools and their Relative Difficulty for Students*. Urbana: University of Illinois Bulletin, Vol. 20, No. 34. Bureau of Educ. Res. Bull., No. 14, 1923. Pp. 26.
106. MONROE, W. S., & MOHLMAN, D. K. Errors made by High School Students in one Type of Textbook Study. *Sch. Rev.*, 1923, 31, 36-47.
107. MONROE, W. S. *Written Examinations and their Improvement*. Urbana: University of Illinois, Bureau of Educ. Res. Bull., No. 9, 1922. Pp. 71.
108. MONROE, W. S. *Introduction to the Theory of Educational Measurements*. Boston: Houghton Mifflin, 1923. Pp. 364.
109. MORGAN, J. J. B. The Effect of Fatigue on Retention. *J. of Exper. Psychol.*, 1920, 3, 319-333.
110. MORRISON, H. C. Study in High School Procedure—Direct and Indirect Teaching. *Sch. Rev.*, 1921, 29, 19-30.
111. MULFORD, H. J. The Child Mind. *Amer. J. of Psychol.*, 1921, 32, 179-195.
112. NUNN, T. P. *Education, its Data and first Principles*. London: Arnold, 1921. Pp. vii+224.
113. NUTT, H. W. *Principles of Teaching High School Pupils*. New York: Century Co., 1922. Pp. 359.
114. O'BRIEN, F. J. A Qualitative Investigation of the Effect of Mode of Presentation upon the Process of Learning. *Amer. J. of Psychol.*, 1921, 32, 249-283.
115. O'BRIEN, J. A. *Silent Reading; with Special Reference to Methods for Developing Speed*. New York: Macmillan, 1921. Pp. xv+289.

116. O'SHEA, M. V. *Mental Development and Education*. New York: Macmillan, 1921. Pp. vii+403.
117. O'SHEA, M. V. *First Steps in Child Training*. Chicago: Drake, 1920. Pp. 284.
118. OWEN, G. [ed.] *Nursery School Education*. New York: Dutton, 1920. Pp. 176.
119. PARKER, S. C. *Types of Elementary Teaching and Learning*. Boston: Ginn, 1923. Pp. 575.
120. PAULI, O. *Zeichnungen aus der Kinderstube*. *Zsch. f. Kinderforsch.*, 1922, 27, 88-92.
121. PEAKS, A. G. *Periodic Variations in Efficiency*. *Educational Psychology Monographs*, No. 23. Baltimore: Warwick and York, 1921. Pp. 95.
122. PATRI, A. *Child Training*. New York: Appleton, 1922. Pp. xii+434.
123. PETERS, W. J. The Progress of Kindergarten Pupils in the Elementary Grades. *J. of Educ. Res.*, 1923, 7, 117-126.
124. PETERS, C. C., & McCCLURE, C. C. Written Versus Oral Method of Teaching Spelling. *Educational Res. Bull.*, Feb. 21, 1922, 1, 51-55.
125. PETERSON, J. Learning when Frequency and Recency Factors are Negative. *J. of Exper. Psychol.*, 1922, 5, 270-300.
126. PIAGET, J. *Essai sur la multiplication logique et les debuts de la pensée formelle chez l'enfant*. *J. de Psychol.*, 1922, 19, 222-261.
127. PORTER, J. E. Some Effects of Segregation on Scholarship at Northwestern High School. *Detroit J. of Educ.*, 1922, 2, 60-65.
128. PRANDTL, A. Die psychische Leistungsfähigkeit bei wechselnder Disposition. *Zsch. f. Psychol.*, 1921, 87, 257-314.
129. PRESSEY, S. L. The Influence of Color upon Mental and Motor Efficiency. *Amer. J. of Psychol.*, 1921, 32, 326-356.
130. PYLE, W. H. *The Psychology of Learning*. Baltimore: Warwick and York, 1921. Pp. 308.
131. RACE, H. V. *Improvability, its Intercorrelations and its Relations to Initial Ability*. New York: Teachers College, Columbia University Contributions to Education, No. 124, 1922. Pp. 68.
132. *Report of the Consultative Committee. Differentiation of the Curriculum for Boys and Girls Respectively in Secondary Schools*. London: H. M. Stationery Office, 1923, Pp. 193.
133. REYMENT, A. R. Some Factors of Aesthetic Judgment. *J. of Appl. Psychol.*, 1922, 6, 34-58, 120-140.
134. ROBINSON, E. S. The Relative Efficiencies of Distributed and Concentrated Study in Memorizing. *J. of Exper. Psychol.*, 1921, 4, 327-343.
135. ROBINSON, E. S., & HERON, W. T. Results of Variations in Length of Memorized Material. *J. of Exper. Psychol.*, 1922, 5, 428-448.
136. ROGERS, A. L. The Relation of an Inventory of Habits to Character Development. *Kind. & First Grade*, 1922, 7, 309-315.
137. RUGG, H. *Social Studies in the Elementary and Secondary School*. Twenty-second Yearbook, Nat. Soc. for the Study of Educ. Part 11. Bloomington: Public School Pub. Co., 1923. Pp. 324. Chapters 1, 11, 15.
138. RUEDIGER, W. C. *Vitalized Teaching*. Boston: Houghton Mifflin, 1923. Pp. viii+110.

139. SALADINI, R. L'alunno aritmetico. *Riv. di Psicol.*, 1920, 16, 81-100.
140. SCHARFE, R. Kurze Anweisung zur Verwendung der freien Kinderzeichnungen bei Untersuchung von Schulneulingen. *Päd. Psychol. Arbeit.*, 1922, 12, 56-64.
141. SCOTT, L., & OTHERS. Record of Group VI. *City and Country School*. New York: Bur. of Educ. Exper., 1921. Pp. 72.
142. SKAGGS, E. B. The Relative Value of Grouped and Interspersed Recitations. *J. of Exper. Psychol.*, 1920, 3, 424-446.
143. SMITH, J. H. Arithmetical Combinations. *Elem. Sch. J.*, 1921, 21, 762-770.
144. SMITH, W. A. *The Reading Process*. New York: Macmillan, 1922. Pp. xii+267.
145. SPENCER, L. T. The Effects of Practice without Knowledge of Results. *Amer. J. of Psychol.*, 1923, 34, 107-111.
146. STANTON, J. *Record of Work, Group 3, in City and Country School*. New York: Bureau of Educ. Exper., 1921. Pp. 29.
147. STARR, H. E. The Hydrogen Ion Concentration of the Mixed Saliva Considered as an Index of Fatigue and of Emotional Excitation, and Applied to a Study of the Metabolic Etiology of Stammering. *Amer. J. of Psychol.*, 1922, 33, 394-418.
148. STONE, C. R. *Silent and Oral Reading*. Boston: Houghton Mifflin, 1922. Pp. xviii+306.
149. STRATTON, G. M. *Developing Mental Power*. Boston: Houghton Mifflin, 1922. Pp. 77.
150. STURT, M. Comparison of Speed with Accuracy in the Learning Process. *Brit. J. of Psychol.*, 1921, 12, 289-300.
151. SULLIVAN, E. T. Mood in Relation to Performance. *Arch. Psychol.*, 1922, 8, No. 53. Pp. 71.
152. TAYLOR, M. W. Some Points in Favor of the Socialized Recitation. *Elem. Sch. J.*, 1922, 22, 776-780.
153. TAYLOR, M. The Child and the Home. *Ment. Hyg.*, 1922, 6, 746-772.
154. TERMAN, L. M., DICKSON, V. E., SUTHERLAND, A. H., FRANZEN, R. H., & FERNALD, G. *Intelligence Tests and School Reorganization. Sub-committee Report, N. E. A.* Yonkers-on-Hudson: World Book Co., 1922. Pp. viii+111.
155. TERRY, P. W. *How Numerals are Read. An Experimental Study of the Reading of Isolated Numerals and of Numerals in Arithmetic Problems*. University of Chicago: Supplementary Educational Monographs, No. 18, 1922. Pp. xiii+109.
156. THOM, D. A. Habit Clinics for Children of Pre-School Age. *Ment. Hyg.*, 1922, 6, 463-470. (Also in *Amer. J. of Psychiat.*, 1922, 2, 31-42.)
157. THOMPSON, J. R. The Interference Factor in Mental Processes. *J. of Exper. Ped.*, 1922, 6, 12-20.
158. THORNDIKE, E. L. The Abilities Involved in Algebraic Computation and in Problem Solving. *Sch. & Soc.*, 1922, 15, 191-193.
159. THORNDIKE, E. L. The Correlation between Interests and Abilities. *Psychol. Rev.*, 1921, 28, 374-376.
160. THORNDIKE, E. L. *The Psychology of Arithmetic*. New York: Macmillan, 1922. Pp. xvi+314.

161. THORNDIKE, E. L. The Effect of Changed Data upon Reasoning. *J. of Exper. Psychol.*, 1922, 5, 33-38.
162. THORNDIKE, E. L. The Permanence of School Learning. *Sch. & Soc.*, 1922, 15, 625-627.
163. University of Illinois. Bureau of Education. Res. Public. No. 10. *Relation of Size of Class to School Efficiency*. 1922. Pp. 39.
164. WAGER, R. E. A Method of Measuring Fatigue of the Eyes. *J. of Educ. Psychol.*, 1922, 13, 561-572.
165. WASHBURN, M. F., HATT, E., & HOLT, E. B. Correlation of a Test of Control of Visual Imagery with Estimated Geometrical Ability. *Amer. J. of Psychol.*, 1923, 34, 103-105.
166. WEBB, L. W. Students' Methods of Studying a Certain Subject. *J. of Educ. Psychol.*, 1920, 11, 193-206.
167. WEBB, L. W. A Comparison of Two Methods of Studying with Application to Foreign Language. *Sch. Rev.*, 1921, 29, 58-67.
168. WEBER, J. J. *Comparative Effectiveness of Some Visual Aids in Seventh Grade Instruction*. Chicago: The Educational Screen, 1922. Pp. 131.
169. WEST, P. V. The Relation of Rythm to the Handwriting Movement. *J. of Educ. Psychol.*, 1922, 13, 438-444.
170. WHEELER, O. A. An Analysis of Literary Appreciation. *Brit. J. of Psychol.*, 1923, 13, 229-242.
171. WHIPPLE, G. M. *Problems in Educational Psychology*. Bloomington: Public School Publishing Co., 1923. Pp. 81.
172. WHITE, W. A. *The Mental Hygiene of Childhood*. Boston: Little, Brown, 1919. Pp. 193.
173. WINCH, W. H. Children's Reasonings; Experimental Studies of Reasoning in School Children. *J. of Exper. Ped.*, 1921, 6, 121-141; 1922, 7, 199-212, 275-287.
174. WINCH, W. H. Equal Additions Versus Decomposition in Teaching Subtraction. *J. of Exper. Ped.*, 1920, 5, 207-220; 261-270.
175. WINZEN, K. Die abhängigkeit der paarweisen Assoziation von der Stellung des besser haftenden Gliedes. *Zsch. f. Psychol.*, 1921, 86, 236-252.
176. WOHLGEMUTH, A. The Influence of Feeling on Memory. *Brit. J. of Psychol.*, 1923, 14, 405-416.
177. WOOD, B. D., & BELL, J. C. Solution of Problems in Geometry. *J. of Educ. Psychol.*, 1920, 11, 316-326.
178. WOODY, C. The Effectiveness of Oral Versus Silent Reading in the Initial Memorization of Poems. *J. of Educ. Psychol.*, 1922, 13, 477-483.
179. WOOLBERT, C. H. Effects of Various Modes of Public Reading. *J. of Appl. Psychol.*, 1920, 4, 162-185.
180. WOOLLEY, H. Pre-School Education. *Amer. Sch.*, 1922, 8, 173-176.
181. ZILLIG, W. Ueber eidetische Anlage und Intelligenz. *Fortsch. d. Psychol. u. ihrer Anwendungen*, 1922, 5, 293-348.

REPORTS

PRESENT STATUS OF INDUSTRIAL PSYCHOLOGY IN JAPAN

BY YOICHI UYENO

Institute of Industrial Efficiency, Tokyo, Japan

It was about 1916 that the Japanese awakened to the practical application of psychology. Prior to this, even the intelligence test and the psychology of advertisement, though reviewed at large, had no practical importance.

Since the awakening, the Psychological Laboratory of the Tokyo Imperial University has discharged its duties as the center of industrial psychology. Psychologists were sent to meet the requirements on every side.

The first request to the Laboratory came from the Navy. There at first arose a question as to the possibility of applying experimental psychology to special operations involved in wireless telegraphy, artillery, engineering, and to aerial and submarine navigation, to the effect that an investigating committee for applying experimental psychology was appointed with Prof. M. Matsumoto and Prof. K. Tanaka of the Tokyo Imperial University as its councillors, who, with the naval officers, carried out their investigations. Lieutenant Commander Ando took charge of the devising of a great variety of experimental apparatus under the care of the two Professors. The preliminary study gradually persuaded the authorities of the practical value of applied psychology.

In the army, the problem has long been pending. The aerial department has early given mental tests for the selection of students. The officers of the military medical school are practicing psychological experiments more or less in their military work, and at all other military schools similar investigations have been made.

The Department of Communications has been also making an accurate study of the methods of experimental psychology and their application. In the Direction General of Post Savings Banks, Dr. K. Suzuki was engaged, and subsequently Dr. K. Chiba took his place and is carrying on the analytic and synthetic studies, which are his special forte.

In the telegraph office, it was found necessary to investigate properly the speed and errors in sending and receiving messages, the fatigue and the periods of rest of the operators. Dr. Tanaka did this work at first, but he was sent abroad to make investigation in foreign countries, so this vacancy has been filled by Dr. E. Awaji and Dr. S. Ishii. They are studying the work of the telephone and collecting much material to serve in the investigation of psychological application.

In the telephone office, Dr. I. Terazawa has carried on his study of the process of the telephone exchange, the fatigue of the operators, the relation between the time of recess and labor, and on the training of workers. Thus he has offered very fine help to those investigating the method of efficiency.

At the Prison Bureau of the Department of Justice, the late Dr. S. Terada and Dr. S. Ishii began their study on the mental state of prisoners from the viewpoint of psychology and psychiatry, and the Department of Child Employment of the Bureau of Social Welfare of the City of Tokyo has also begun the application of psychology. The Tokyo Municipal Society for the Encouragement of Commerce and Industry has also established a training school for efficiency engineers. Its students are working men chosen from large factories and other companies and shops in Tokyo. They hear lectures of professors in the field of efficiency methods and scientific management in factories, etc. Dr. Y. Uyeno is making efforts to synthesize all their knowledge and to have the system to install in commerce and industry.

One more fact we must not forget is the establishment of an Institute of Industrial Efficiency as a branch of Kyocho-Kai (Association for Harmonious Coöperation between Capital and Labor). It is certain that the Institute will in future become a center for the applications of psychology. Dr. Uyeno is head of it. He is endeavoring to install in the factories of Tokyo and Osaka scientific management shown in the establishments of Taylor and Gilbreth.

SUGGESTIONS FOR THE INVESTIGATION OF THE PSYCHOLOGY AND PSYCHOPATHOLOGY OF VOCATIONAL CHOICE AND VOCATIONAL CHANGES¹

BY W. ELIASBERG

Munich

I. The Problem. 1. It is proposed to seek a classification of life careers in terms of vocations. Until now, besides the life careers of youthful, essentially selected cases, we know only the life careers of subjects selected either by reason of nonconformed behavior or development in the direction of psychotic personality. Among the latter are included the life careers of criminal offenders and even these, until now, have been examined only in so far as they aroused suspicion of mental disorder and for that reason came under the observation of the psychiatrist.

2. An essential characteristic of the individuals whom we are considering here is that they have suffered a brain injury either after or shortly before completing their vocational training.

3. The influence of this accident upon the individual is to be evaluated.

4. For this purpose it is necessary to have a picture of the individual as he was before the accident. For this reason all observable biological and sociopsychological factors which influenced the life of the individual either during the period of development or maturity must be sought out.

Under the sociopsychological factors the vocation is brought into special prominence.

As a matter of fact, work and vocation, as civilization forces, appear to be equal in importance to religion and tradition in the Middle Ages.²

5. The reciprocal relation between the total psychophysical predisposition and choice of vocation must first be made clear.

6. The same point of orientation must be used in considering the premorbid vocational changes.

¹ Translated from the German by Morris S. Viteles, University of Pennsylvania.

² Cf. Eliasberg: *Arbeit und Psychologie, Arch. f. Soz. Wiss.* Bd. 50, Pp. 87 ff.

7. After the character of the premorbid individual and his changes in vocation have been made clear an examination will be made, by means of a statistical study of changes in occupation among the general population, to determine whether already at an early stage the premorbid individual presented peculiarities.

8. Only after such a study can the injury be evaluated, from both the somatic and psychological points of view, with reference to its vocational importance. To some extent this can be done to best advantage after the isolation of all the biological and sociological tendencies which have already been shown to exist in the pretraumatic individual.

9. Two vocations have been chosen for consideration (without, however, putting aside altogether other occupations). These occupations, namely those of nonproprietary farmer and nonproprietary machinist working in a factory or small workshop, present an important difference in spite of certain similar tendencies. The effect of the factor of nonindependence must be determined by means of a control investigation of independent (workers) and university students. The vocational fate of children from peasant circles left dependent as a result of brain injury should be separately studied. However, in considering the problem from the point of view of number and analogy, the observation of types must not be neglected.

II. *The Methods.* 10. The following serve as fundamentals: (a) An authentication by the different types of officials, priests, teachers, employers, etc.⁸ (b) The notes and introspections of those examined. (c) The findings and judgments of the actual investigator, namely the doctor, the psychologist, the pedagogue.

11. The investigators should examine carefully the individual factors upon which their judgment is formed. They should judge those factors individually, independently from one another, and only at the close of the examination bring each to bear upon the question of vocation.

12. The most important factors or influences to be considered in making judgment are: (a) The physical condition (independent of the injury). (b) The premorbid personality of the individual. (c) The character of the injury and its effect upon body and mind. (d) The actual psychophysical makeup of the individual in terms of "abstracted" measurement of performance and of intuitive psychological impression.

⁸Cf. in this connection with the methodology of Wilmanns: "*Psychopathologie der Landstreicher.*"

Only upon the basis of all of these individual factors should a decision be reached whether and to what degree changes in personality or changes in type of performance or in social influences are of importance, and the vocational fate of the injured individual be determined.

III. *Additional Data To Be Sought.* 13. By means of a comparison of introspection, judgments of the present investigator and previous judgments the present decision should be made as impartial and objective as possible. Facts should also be unearthed on the extent to which the average individual is able to determine exactly his vocational and life career. Typical errors in judgment should also be revealed.

14. What is the nature of the errors in judgment in the case of physicians, skilled workers in the trades and laymen (of normal intelligence) ?

15. A series of questions requires the investigator to set down the peculiar characteristics of the individual examined (a psychogram). The present psychogram should be compared with the judgments of earlier examinations.

IV. *Summary.* 16. The effect of brain injury upon vocational career is to be examined from both the somatic and psychopathological points of view. This can only be done in combination with a careful consideration of all the sociological factors. That which has been shown to be of importance in the consideration of vocational career is also of importance for psychopathology. The effect of psychopathological events upon the individual can be determined only by a comparison with social influences. The same limitation, in the reverse direction, is true of social investigation. This has often been recognized theoretically, but in actual practice it is still often forgotten.

SPECIAL REVIEWS

WOOLLEY, H. T., & FERRIS, E. *Diagnosis and Treatment of Young School Failures*. Bureau of Education Bulletin, 1923, No. 1. Washington: Government Printing Office, 1923. Pp. 115.

In Cincinnati in September, 1917, an "observation class" was organized for seriously retarded children in the first and second grades who were above the usual limits of mental defect. This bulletin consists in a somewhat detailed report of the first observation class of 16 children, and the history of each child down to the summer of 1921, together with the general conclusions which can be drawn from four years of effort and continued observation. The children have been grouped under four heads, according to what proved to be the dominant cause of the difficulty: (1) Children who were neglected; (2) those who were high-grade defectives, though their intelligence quotients were still above the usual limits for defect; (3) those with special defects which make the acquisition of a given type of knowledge unusually difficult; and (4) the psychopathic. Nine of the 16 children fell into the first group. Although it was out of the power of the school to remedy most of the conditions which had contributed to the failure of these children, nevertheless by securing regular attendance, giving the personal attention possible in a small class, and above all by surrounding the children with a schoolroom atmosphere of encouragement and a real spirit of endeavor, it proved possible to make up at least part of what they had lost and return them to regular grades in which they were not much over age. A striking observation is that in every instance, except those of the children who were ultimately shown to be feeble-minded, and one of those who was suffering from special disabilities, the intelligence quotient rose while the child was in the observation class and fell after he left it. One of the very useful features of the bulletin is an outline of procedure in the diagnosis of young school failures, under the headings mental level, academic history, state of health, general mental tone and attitude, and heredity. The individual histories are given and form a valuable supplement to the study.

HORNELL HART

UNIVERSITY OF IOWA

Bericht über den ersten Kongress für Heilpädagogik. Berlin: Springer, 1923. Pp. 134.

An account has been received of the discussions of the first Kongress für Heilpädagogik held in Munich, August 2-5, 1922. This word for which there is no English equivalent embraces all branches of educational and remedial work for the defective and handicapped classes. The members of the Gesellschaft für Heilpädagogik formed at this time include physicians, psychologists, ministers, wardens, vocational advisers, judges of juvenile courts, and officers of various custodial and educational institutions. A congress will be held every two years. It is proposed that persons in all parts of the world who are working on problems along the lines indicated shall coöperate as members of a research institute and that later a central station for such work shall be established.

Qualified persons may become members upon payment of a single fee. The qualification for membership is direct participation in some branch of Heilpädagogik through publication of research or work as official in some institution.

Forty-four papers were read at the meetings. The subjects of these ranged from purely medical contributions through psychological and psychiatric discussions to considerations of methods of training and even of administrative costs.

The congress serves a useful function as a clearing house for information in regard to scientific advances of interest to all who are professionally engaged in such work.

LORLE I. STECHER

UNIVERSITY OF IOWA

LILLIEN J. MARTIN and CLARE DE GRUCHY. *Mental Training for the Pre-School Age Child.* San Francisco: Wagner, 1923. Pp. 108.

The authors point out the importance of the mental hygiene of the child of pre-school age inasmuch as the character pattern of the adult is so often already fixed in extreme youth. In the Foreword, the authors tell of the interest which has been aroused by Dr. Martin's mental hygiene clinic for young children. Then follows a "Mental Health Questionnaire" the filling out of which is part of the routine of that clinic. It contains 17 questions each of which can be eventually answered by the examiner either in the affirmative or negative.

The rest of the book consists of a series of chapters of some half dozen pages each in which are successively developed each of the 17 questions. These range from mental, social and physical environment to such topics as punishment, and the sympathy of the parents. Each of the chapters contains illustrative case material, obtained by Dr. Martin in her clinical experience, which is extremely illuminating.

The importance of psychological examinations for the normal as well as for the bright or dull child is emphasized as is also the necessity of proper physical health for mental development. Habit forming and habit breaking are treated in two chapters. Under the general topic of delinquency, lying, stealing, running away and fighting are treated in a very sympathetic manner. The chapters on Imitation, Emotional Development, Emotional Control, Punishment, and Sympathy are really concerned, as they should be, with the education of the parents rather than with the education of the child. The reviewer takes exception to the heading of a chapter called the "Storing of the Subconscious." The chapter itself is excellent and contains suggestions for developing the imagination of young children.

The book is written in a very simple form which should appeal to intelligent parents who do not have special psychological training. Although it was written primarily for this purpose, a great deal of the clinical material and many of the points of view should be of interest to the psychologist who is interested in child development.

SAMUEL W. FERNBERGER

UNIVERSITY OF PENNSYLVANIA

OTIS, A. S. *Otis Classification Test.* (Two Forms, A and B, Standardized on Grade 4 to 8, inclusive.) Yonkers: World Book Co., 1923.

The Otis Classification Test is intended to measure mental alertness as well as achievement. It is divided into two parts. One part is an intelligence test in the cycle form. The second part is also in the cycle form and contains a mixture of informational questions on geography, history, civics, physiology, music, general information, and arithmetic.

Tests of this type in which achievement and mental alertness are both measured by objective scales are being developed by several psychologists. It is a logical step in the advance of the edu-

tional measurement movement. Intelligence tests have erroneously been used for school grading. A child's promotion through the grades should not be a function of intelligence. It should be a function of school attainment and school attainment only. The intelligence tests serve their purpose for classifying children who enter school and for segregating children into sections according to ability, but promotion should always depend upon school attainment rather than on intelligence. Measurement scales in which school attainment and alertness are both measured will probably be used very extensively.

L. L. THURSTONE

INSTITUTE FOR GOVERNMENT RESEARCH.

JOHANNES VON KRIES. *Allegemeine Sinnesphysiologie*. Leipzig: Vogel, 1923. Pp. x+299.

In the midst of the great mass of technical papers which have resulted in recent years from investigations of the sense organs, it is a great satisfaction to turn to a volume such as the present one by Professor v. Kries, who has had an unequalled preparation for the conception and production of the work he has brought out. He is a physiologist and psychologist of wide experience in the field of which he writes, but, more than that, he is a philosopher and logician. In the compass of three hundred pages he provides us with a comprehensive survey of the problems of sense physiology and the progress that has been made towards their solution. The author deals for the most part with the sense organs of man. The work is not a "comparative" physiology, therefore, in the ordinary meaning of that term; rather, it treats of the *general* problems of the functional relations of the sense organs to the processes of the central nervous system, particularly as the latter have to do with perceptions, sensations, and the more complex psychic states. The point of view from which the author writes is on the whole physiological.

The book is arranged synoptically. It has a comprehensive table of contents and index, and each of the nine chapters is headed by a short outline of the subjects to be discussed. While a complete bibliography is not provided, there are numerous references to the important works. The reader finds a great variety of topics,—more than can be mentioned within the limits of a review. Altogether, they constitute a subject exceedingly difficult to handle.

The present work is unique in its manner of presentation and is characterized by lucidity of treatment. It has a wealth of illustrative material, supported by experimental test, and the points and conclusions set down are passed under review by one whose critical judgment rests upon the reflection and experiment of many years and upon a great knowledge of the literature dealing with his subject. If the result of his critical treatment reveals much that is faulty in the conclusions reached in the past, it is just this which makes the book a valuable one.

The work is of value, too, because it collects the results from the various departments of the senses and weaves them into an orderly and logical treatise. It brings out the close parallelism that exists between the phenomena of the two domains—physiological and psychological. An outstanding fact is that in the consideration of the phenomena revealed by the intact nervous system of man, and by certain pathologic cases, we cannot say that a sharp division separates physiological from psychological processes. While the reviewer mentions this principle of parallelism as a prominent feature of the book, there is also much more of interest to the physiologist and psychologist—and to the psychiatrist, too—for the author gives a great deal of attention to such matters as the basis on which our judgments rest, and the intricacies of the processes involved. In the discussion, the importance of accessory and modifying conditions which may affect sense impressions is given the prominence which it deserves. It is shown that comparatively small alterations in a given set of conditions,—accessory circumstances which might be regarded as of relatively minor importance,—may produce results of great consequence in psychological processes. The development of ideas of time and space, and their fundamental place in the psychological life, are also discussed at length. The three chapters devoted to these subjects are extremely interesting and illuminating. While many points that are theoretical and philosophical are met with in this division of the book, the discussion of them is carried on with due regard to their place in a work of this sort, so that the author makes frequent reference to his "Logic" (Tübingen, 1916), in which a fuller treatment of related theoretical matters may be found, and also to the works of other writers.

A critical and logical discussion of the subject, such as this one by the learned Freiburg professor, is bound to show how far we are from a satisfactory solution of many problems in this field, and yet it reveals how much progress has been made. This feature is well

illustrated by the author's remarks on contrast in the last two chapters in which he considers in some detail the long controversy between the Helmholtz and Hering Schools on the explanation of simultaneous (brightness- and color-) contrast. The same is true of his discussion of the psychophysical law in the preceding pages.

A six page summary closes this interesting book. The author again points out that while in the narrower field of *special* sense physiology we have many precise observations on the close relation of stimulus to sensation, which at least orient us in a satisfactory way in our investigations, it is not so in the broader field of *general* sense physiology, as defined at the start. In the larger field we find many interesting questions but few positive and established facts. We are under the necessity of making use of hypotheses. Whether or not one becomes convinced of a material basis for the most complex psychological phenomena will depend on his manner of approach to the problem. Here the data of sense physiology have a special significance. Perhaps only those of pathology have a similar, or even greater, significance in their bearing upon this absorbing problem of the relation of the processes in the nervous structures to the phenomena of the conscious and unconscious states.

It is hoped that an English translation of this valuable work will be forthcoming.

M. DRESBACH

ALBANY MEDICAL COLLEGE

F. M. URBAN. *Grundlagen der Wahrscheinlichkeitsrechnung und der Theorie der Beobachtungsfehler.* Teubner, Leipzig, 1923. Pp. vi+274.

The book originated from the lectures in a course on statistics which Urban gave at the University of Pennsylvania from 1907 to 1914. The original plan was to write a manual which should serve as a textbook in this or in similar courses, and which should cover the entire field of the calculus of probabilities and its applications. Statistical methods are conceived as practical applications of the calculus of probabilities. A student of statistics should possess a good working knowledge of probabilities. Students not primarily interested in mathematics acquire this knowledge best by studying the propositions as they come up with the practical problems of the course. A book can not be arranged along this line. The propositions on probabilities must be deduced from general principles, and their practical application must follow later.

The book begins with a discussion of the ideas of chance and probability. This first part seems to be intended as a philosophical introduction to the mathematical problems, in the same way as Laplace wrote his *Essai philosophique sur les probabilités* as an introduction to his big work. The foundations of the calculus of probabilities require careful investigation. The classic definition of probability enables one to construct a consistent system of propositions which are in agreement with the results of observations on chance events. This may easily induce one to overlook the intrinsic difficulties of the question. The idea of chance implies that certain events are not causally necessitated by their conditions. This is in contradiction to the idea of general causation which admits of no exception. It seems curious that science could use these contradictory ideas with equal success. This suggests the view that chance and probability may be defined in such a way as not to imply the denial of causation. Many explanations have been tried, but without success. Before giving his own solution, Urban discusses these views at some length. His presentation is fairly complete and accurate, and the reader gets reliable information as to the history of this problem.

It is not intended to solve the general question of chance and probability, but the question is restricted to the meaning of these notions in the calculus of probabilities. There are some classes of events to which the propositions of the calculus of probabilities apply. When taken in large numbers these events show the regularities required by the calculus. Should the principles of this analysis imply the denial of causation, we would have to conclude that these events do not causally depend on their conditions.

The most conspicuous feature of the so-called chance events is the fact that we are ignorant as to the outcome of an individual experiment. We know that the result must have certain general features and that it must belong to one of two or more classes, but we are unable to say to which one it will belong. Games of chance are the typical example of events of their kind. These games have no interest for science except the fact that we are able to draw certain legitimate conclusions and to foretell the result in spite of our inability to predict the result of a single experiment. The calculus of probabilities very likely would not have been invented without the incentive to investigate events which apparently give no hold whatsoever to our analysis. It is not surprising that it was tried to

define chance by our ignorance as to the outcome of a particular trial, and that this definition found great favor.

Urban insists that mathematical probability does not imply the denial of causation, and that our ignorance as to the outcome of a particular trial is a superficial feature, which has nothing to do with our ability or inability to apply the propositions of the calculus of probabilities to a class of events. He proves this point by examples in which there is not the slightest doubt as to the strict causal necessity, or to our ability to foretell every single result in all its details. He then proceeds to examples in which there is an equal agreement between theory and experience and where there is no doubt about the strict causation of the phenomena, but where there exists a certain amount of ignorance as to the individual result. In these cases one can definitely say which enlargement of our information would make this uncertainty disappear. Our information would then be complete, but the events would still possess the random character required for the application of the calculus of probabilities. Compliance with the requirements of the calculus of probabilities is an objective criterion, which can not be changed by any knowledge—or lack of knowledge—which we may have.

From this it follows that it is not any ignorance of ours which warrants the application of the calculus of probabilities, but that it is entirely indifferent whether this ignorance exists or not. It is also proven by these examples that the calculus of probabilities applies to events which are causally determined. Probability, therefore, does not imply the denial of causation. What is needed for assigning a certain, numerically defined probability to an event is very definite information, the character of which will be explained presently. The more reliable this information is, the more valuable becomes the result calculated on this basis.

The second part of the book contains the mathematics of probability. Here the author starts on entirely novel lines by basing the calculus of probabilities on the modern theory of ensembles. The elements of a class are defined in regard to those qualities which the definition of the class implies, but they are undetermined in regard to qualities not contained in the definition. Every object belonging to a class possesses all its qualities necessarily. When we speak of an element in general, we know that it must possess the characteristics of the class, but nothing is known about the presence or absence of qualities not contained in or implied by the definition. Considering an object merely as an element of a certain class is the

logical equivalent of chance selection. Certain statements are possible in regard to the result of such chance selections, which form the object of the calculus of probabilities.

The matter is much simplified by this definition. Difficulties due to the classic definition of probability disappear, and the way is shown to the solution of new and interesting problems. We just mention the mooted question of equally possible cases. Instead of the hairsplitting discussions of former authors we find in a chapter under this heading an investigation on the processes which result in randomness of events. The text differs in many respects from the customary presentation of the textbooks, but it would lead too far to go into details. We just mention that the theory of least squares is deduced in connection with Bernoulli's theorem.

The chapter on the theory of errors of observation is of great interest to psychologists. In psychophysics the interval of uncertainty is taken as measure of the accuracy of sense-perception. This definition also applies to the case that the sense-organs are aided by telescopes, balances, microscopes, and other devices as used in physics, astronomy, or geodesy. Even in the case of the eye aided by the most powerful microscope there exists a certain limit of the accuracy of perception.

Every method of measurement refers to a mechanical, optical, or other device by which the senses are aided in the perception of the quantities concerned. Such a method, furthermore, gives a rule for finding the value of the quantity measured by successive comparisons with known quantities. The analysis of any such procedure leads to formulae analogous to those of the method of just perceptible differences. Any such rule for assigning a certain value to the unknown quantity contains implicitly a definition of the point of subjective equality. It is shown that the procedures commonly used in physics, geodesy, and astronomy imply the definition of the point of subjective equality used in psychophysics,—namely the arithmetic mean of the lower and the upper limit of the interval of uncertainty. In these cases the interval of uncertainty is inversely proportional to the quantity known as the Gaussian measure of precision. From this it follows that the Gaussian coefficient is in the same sense a measure of the accuracy of observations as the interval of uncertainty is a measure of the accuracy of perception. Formerly the coefficient of precision was introduced by an arbitrary definition. This result connects the theory of errors of observation with psycho-

physics and gives an insight into the presuppositions of the method of least squares.

It is no exaggeration to say that Urban's book is different from any former book on the calculus of probabilities. It contains a surprising amount of new thought. Psychologists will be particularly interested in the connection between psychophysics and the theory of errors of observation. Should this view be accepted we would have here indeed one of the most remarkable contributions of psychology to general science.

S. W. FERNBERGER

UNIVERSITY OF PENNSYLVANIA

BOOKS RECEIVED

ALLPORT, F. H., *Social Psychology*. Boston: Houghton Mifflin, 1924, xiv+453.

BARDONNET, L., *L'Homme Psychologie*. Paris: Vrin, 1923, Pp. 670.

DE MONTET, CH., *The Primary Problems of Medical Psychology*. (Trans. by A. Newbold.) New York: Wood, 1923, vii+142.

FOSTER, W. S., *Experiments in Psychology*. New York: Holt, 1923. Pp. x+309.

FREUD, S., *Cinq Leçons sur la Psychanalyse*. Paris: Payot, 1923. Pp. 123.

GAULT, R. H., *Social Psychology*. New York: Holt, 1923. Pp. x+336.

HENNING, H., *Der Geruch*. Leipzig: Barth, 1924. Pp. 434.

HERTZ, P., *Über das Denken*. Berlin: Springer, 1923. Pp. x+163.

LILLIE, R. S., *Protoplasmic Action and Nervous Action*. Chicago: Univ. of Chicago Press, 1923. Pp. xiii+417.

PINTNER, R., *Intelligence Testing*. New York: Holt, 1923. Pp. v+406.

SNOW, A. J., *Problems in Psychology*. New York: Holt, 1923. Pp. vi+115.

NOTES AND NEWS

DR. WILLIAM T. HERON (Chicago) has been appointed assistant professor of psychology at the University of Kansas.

DR. GRACE K. ADAMS (Cornell) has been appointed instructor in psychology at Goucher College.

JAMES SULLY, formerly professor of mind and logic at University College, London, died on November 2, at the age of eighty-one years.

AT the commencement of Wesleyan University the doctorate of laws was conferred on Dr. James Rowell Angell, president of Yale University, and the doctorate of science on Dr. Robert M. Yerkes, of the National Research Council.

DR. STEPHEN S. COLVIN, professor of education at Teachers College, Columbia University, died suddenly on June 15th at the age of fifty-four years.

PUBLISHER'S NOTICE

The cost of printing has increased considerably since our present subscription rates came into effect in 1920. We have delayed making additional changes, in the hope that the peak was reached. On the contrary there has been a further rise in printing costs within the past few months. Our subscription rates no longer meet the cost of publication. We are therefore compelled, most reluctantly, to fix a new scale of rates for all our publications. The revised list appears on the second cover page. Subscribers will please note the advantageous combination rates offered.

The new prices will take effect July 1.

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